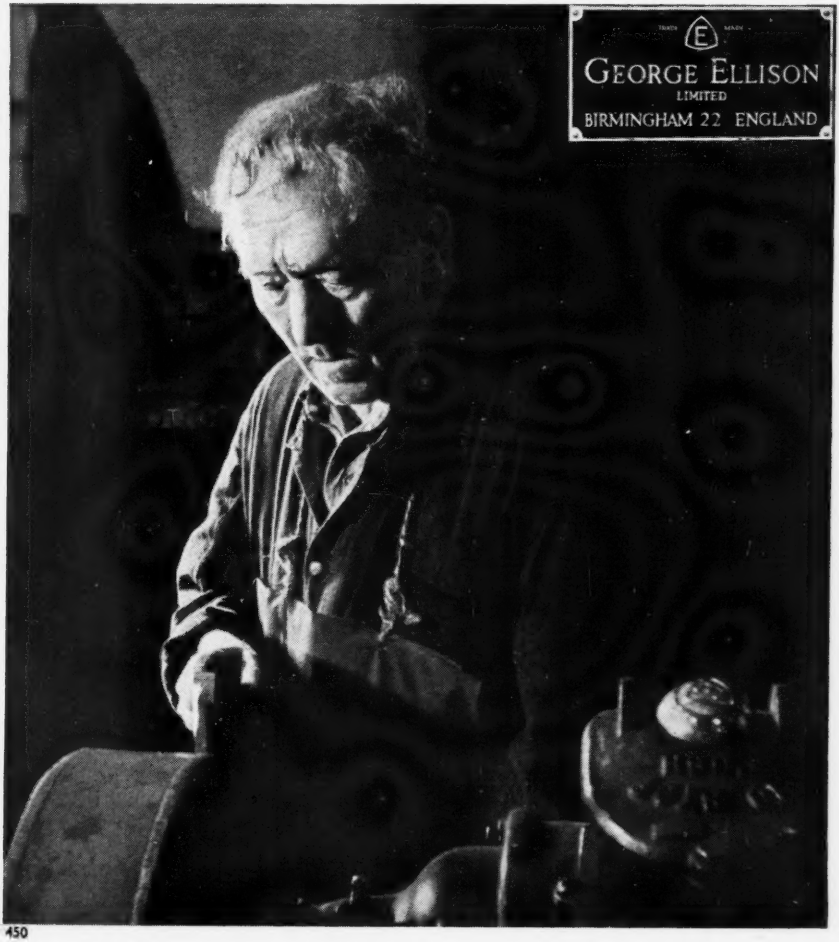
ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXI. No. 3371. JULY 3, 1942 6d. WEEKLY



AN APPEAL TO CABLE USERS

ROLL OUT THE DRUMS

AND RETURN THEM **WITHOUT DELAY** TO YOUR SUPPLIERS

Every cable drum lying idle means a 'stop' on some vital source of supply. The war effort needs cables—cables need the idle drums.

Save timber and speed up production by emptying the drums as quickly as you can and turning them back into circulation. The Railway Cos. will do their utmost to help.

ISSUED IN THE NATIONAL INTEREST BY MEMBERS OF THE

CABLE MAKERS ASSOCIATION

Advt. of the Cable Makers Association, High Holborn House, 52-54 High Holborn, W.C.1. 'Phone: Holborn 7633

HEATRAE

ELECTRIC WATER HEATERS

Silent Eloquence.

There are two things that speak inaudibly—the quality of a Firm's workmanship and the reputation established thereby.

Therein, silence becomes veritably golden.

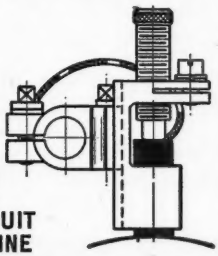
HEATRAE LTD NORWICH · GRAMS "HEATRAE" NORWICH · PHONE: NORWICH 25131

"WESTMINSTER"

Brush Holders

100,000 SUPPLIED

MADE TO SUIT ANY MACHINE



Dynamos and Motors Rewound and Re-constructed. "Partridge" Pressure Detectors, "Partridge" Earthing Devices, Switchgear, Photographic Arc Lamps, Electric Welders, Medical Arc Lamps

The WESTMINSTER ENG. Co. Ltd.

Victoria Road, Willesden Junction, N.W.10

Telephone: Willesden 1700-1 *Telegrams:* "Regency, Phone, London."

THE "FACILE" TERMINAL

Send for Prices and List of all kinds of Terminals.

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ASHBROOK ROAD, LONDON, N.19

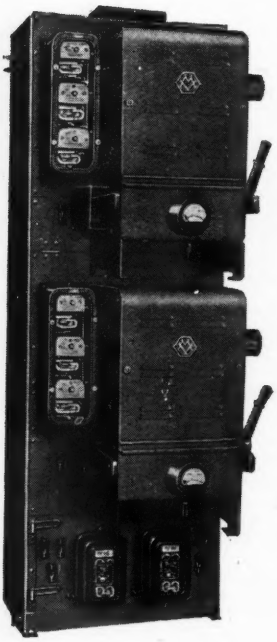
SPACERS

to the specific requirements of our customers.

Makers of all types of repetition products from the bar in all metals.

M·C·L and REPETITION LTD. Pool Lane, Langley, Birm.

Introducing



COMPLETELY INTERLOCKED

the new air-break

SWITCHGEAR

TYPE A·I·R

BREAKING CAPACITY

25 M.V.A at 400 volts

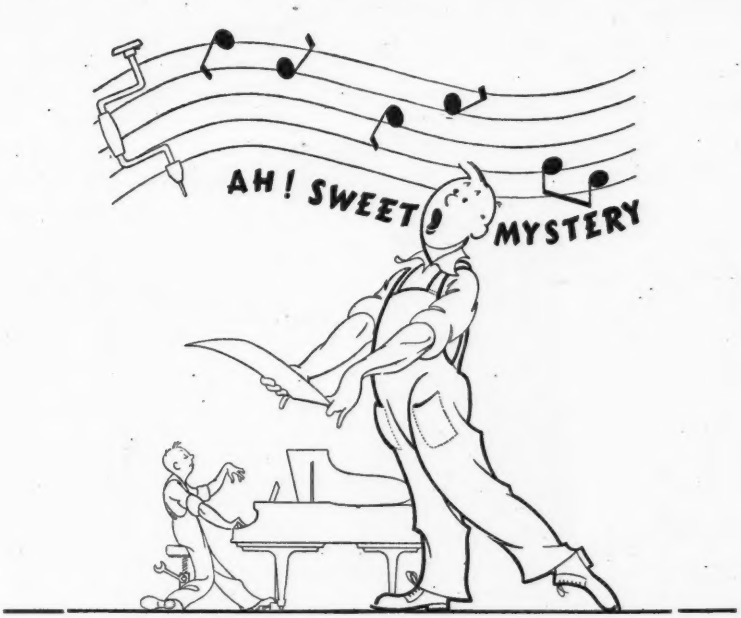
IN ACCORDANCE WITH THE REQUIREMENTS OF BS116/1937

AEI

METROPOLITAN Vickers ELECTRICAL CO. LTD.

TRAFFORD PARK ··· MANCHESTER 17.

F/A105

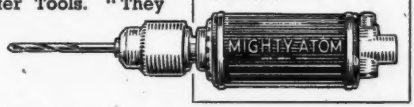
COSMOS LAMPS *Metrovick's 'light' product*

LETTER FROM SATISFIED CUSTOMER:

"Having used a number of different makes it beats me why Desoutter Tools are not universally used. Can you explain this mystery?"

Well, yes, Sir, as a matter of fact we *can*, but you mustn't repeat it or we shall get in bad with engineers who are, of course, our customers. The fact is that engineers (ourselves included) always pretend that they buy on *"technical facts alone."* *Salesmanship—boo! boo!!* But acksherly, of course, us engineers are very much like human beings. We like a thing because we're used to it; we don't change because it might mean a bit of trouble; we haven't the time to find out and test every new instrument and gadget that claims to be "the best."

So that's why lots of engineers are still plodding along quite happily without Desoutter Tools. "They don't know what they're missing," you say? Well, that's not for us to comment on.

Type M.1. Mighty Atom ⅜" drill. A general purpose tool with a chuck speed of 2,500 r.p.m. weighing only 1¼ lbs., available with or without pistol grip.



DESOUTTER

Specialists in Lightweight Pneumatic & Electric Portable Tools.

DRILL GUNS · SCREWDRIVERS · NUTRUNNERS · SHEARS · GRINDERS · COUNTERSINKING TOOLS
BOLT MILLING TOOLS · DESOUTTER BROS. LTD., DEPT. R, THE HYDE, HENDON, LONDON, N.W.9.
TELEPHONE: COLINDALE 6346-7-8-9. TELEGRAMS: DESPNUCO, HYDE, LONDON. WORLD-WIDE REPRESENTATION

C.R.C. 126

ELECTRIC MOTOR POLISHERS

A. C. 4 BEARINGS
400 VOLTS, 3 PHASE
50 CYCLES.
1, 2, 3, 4 AND 5 H.P.

DELIVERY—
IMMEDIATELY ON
RECEIPT OF MACHINE
TOOL LICENCE AND
CONTRACT NUMBER

for IMMEDIATE DELIVERY!!

W. CANNING & CO. LTD
GREAT HAMPTON STREET
BIRMINGHAM · 18

B T-H

A.C. VARIABLE-SPEED COMMUTATOR MOTORS

from

3 HORSEPOWER upwards

High efficiency at all speeds.

Simple starting—by direct switching. No rheostat required.

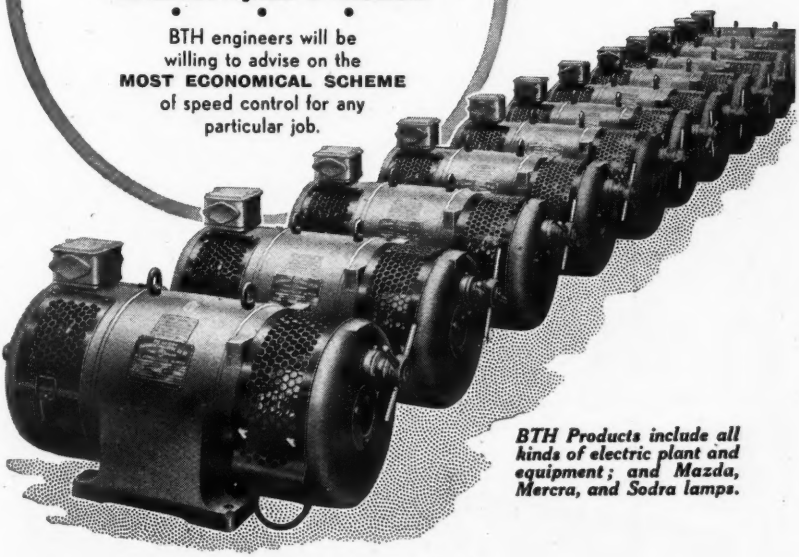
Hand, remote, or automatic speed control.

Absolutely smooth speed change and stable operation over widest speed range.

Speed variation by self-contained means —no external regulator or resistances.

• • •

BTH engineers will be willing to advise on the **MOST ECONOMICAL SCHEME** of speed control for any particular job.



BTH Products include all kinds of electric plant and equipment; and Mazda, Mercra, and Sodra lamps.

BTH THE BRITISH THOMSON-HOUSTON CO., LTD.
CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

A3102

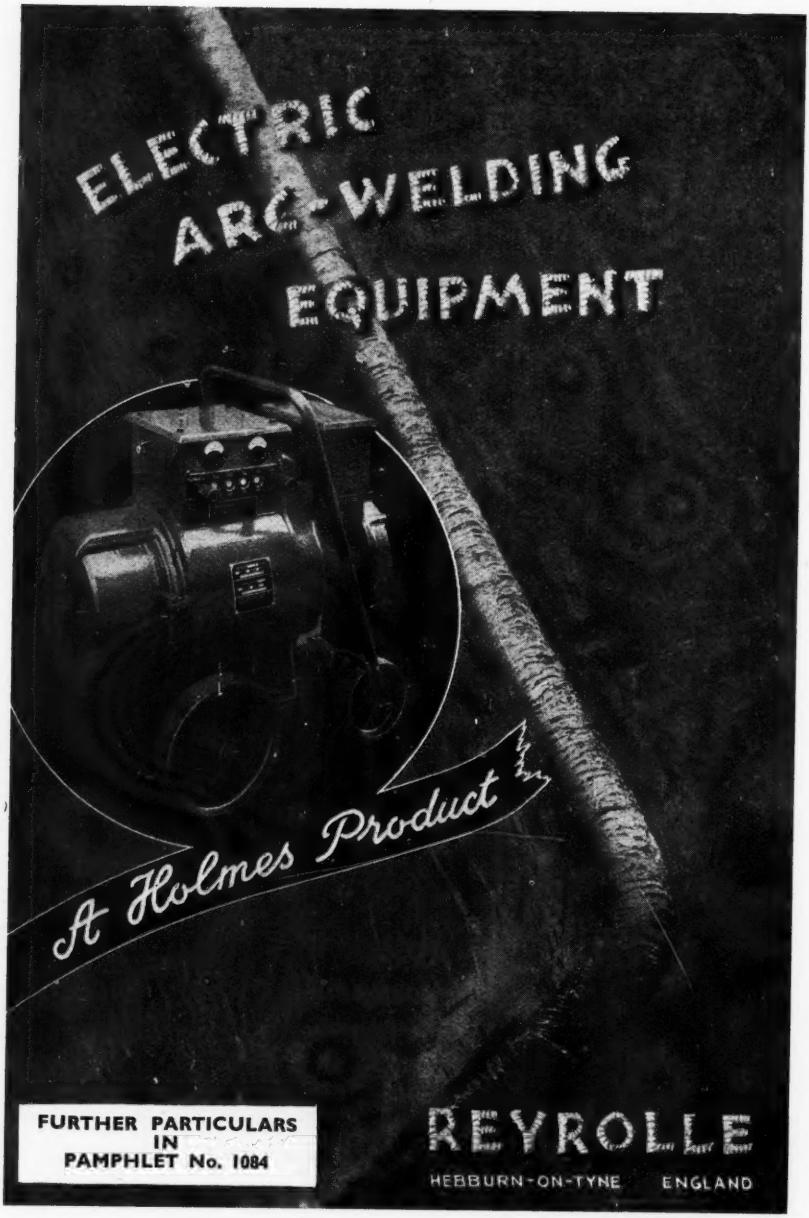
Advt. of The General Electric Co. Ltd. Head Office: Magnet House, Kingsway, London, W.C.2

STURTEVANT CONSTANT TEMPERATURE PLANT FOR GAUGE ROOMS

Among the many Air Conditioning Installations by Sturtevant are a number in the engineering industry. The above illustration shows the measuring room of one of the leading British gauge-making firms. This room, used for measuring work to tolerances of 0.0001 inch or finer, is kept at a constant temperature thermostatically controlled and maintained day and night and week-ends at 68°F. The air is delivered to the room dust-free and is also **ample for the ventilation requirements under black-out conditions.**

Sturtevant Air Conditioning in its many possible variations finds wide applications in all branches of industry—**particulars and some illustrations are given by our publication U1382.**

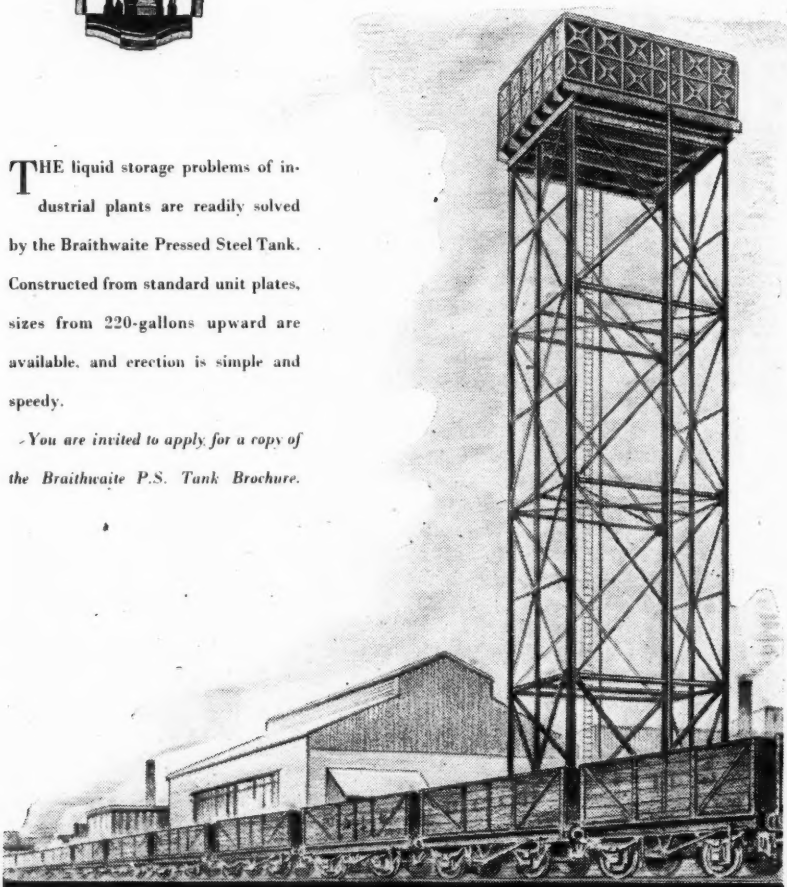
STURTEVANT ENGINEERING CO. LTD.
25. WORCESTER ROAD, SUTTON, SURREY.


ELECTRIC
ARC-WELDING
EQUIPMENT
A Holmes Product
FURTHER PARTICULARS
IN
PAMPHLET No. 1084
REYROLLE
HEBBURN-ON-TYNE ENGLAND

HOLOPHANE INDUSTRIAL LIGHTING
A complete range of fittings enables any industrial lighting problem to be solved by Holophane. The translucent type shown here, is useful where some upward light is required without any loss of downward light.
HOLOPHANE
ILLUMINATION
These fittings are on display and their application can be discussed at:—
HOLOPHANE LTD., ELVERTON STREET, LONDON, S.W.1
Telephone: Victoria 8062 (4 lines).

THE liquid storage problems of industrial plants are readily solved by the Braithwaite Pressed Steel Tank. Constructed from standard unit plates, sizes from 220-gallons upward are available, and erection is simple and speedy.

You are invited to apply for a copy of the Braithwaite P.S. Tank Brochure.



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RECOGNIZED STANDARDS OF EXCELLENCE . . .

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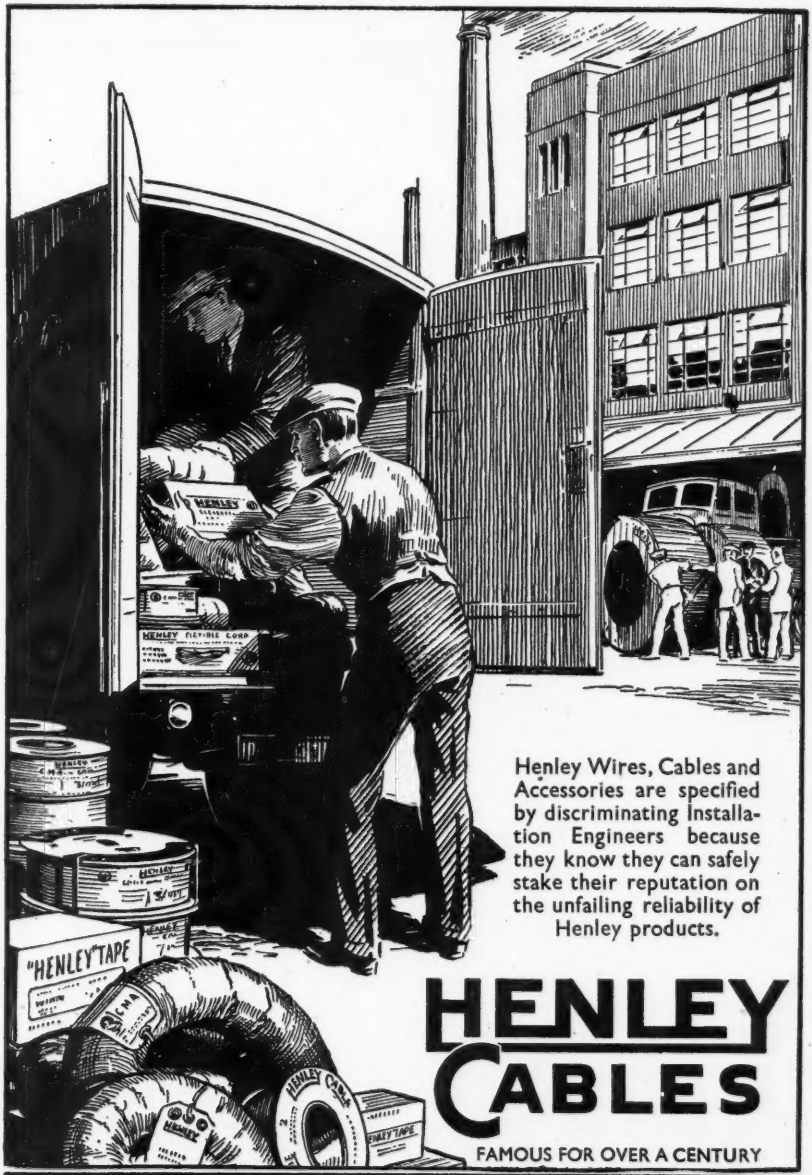
'BELLING' ELECTRIC FIRES AND COOKERS

Available only for essential war purposes

'Belling'

BELLING & CO. LTD., BRIDGE WORKS, ENFIELD, MIDDLESEX • 'Phone: HOWARD 1212

C.R.C. 375



Henley Wires, Cables and Accessories are specified by discriminating Installation Engineers because they know they can safely stake their reputation on the unfailing reliability of Henley products.

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FAMOUS FOR OVER A CENTURY

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.

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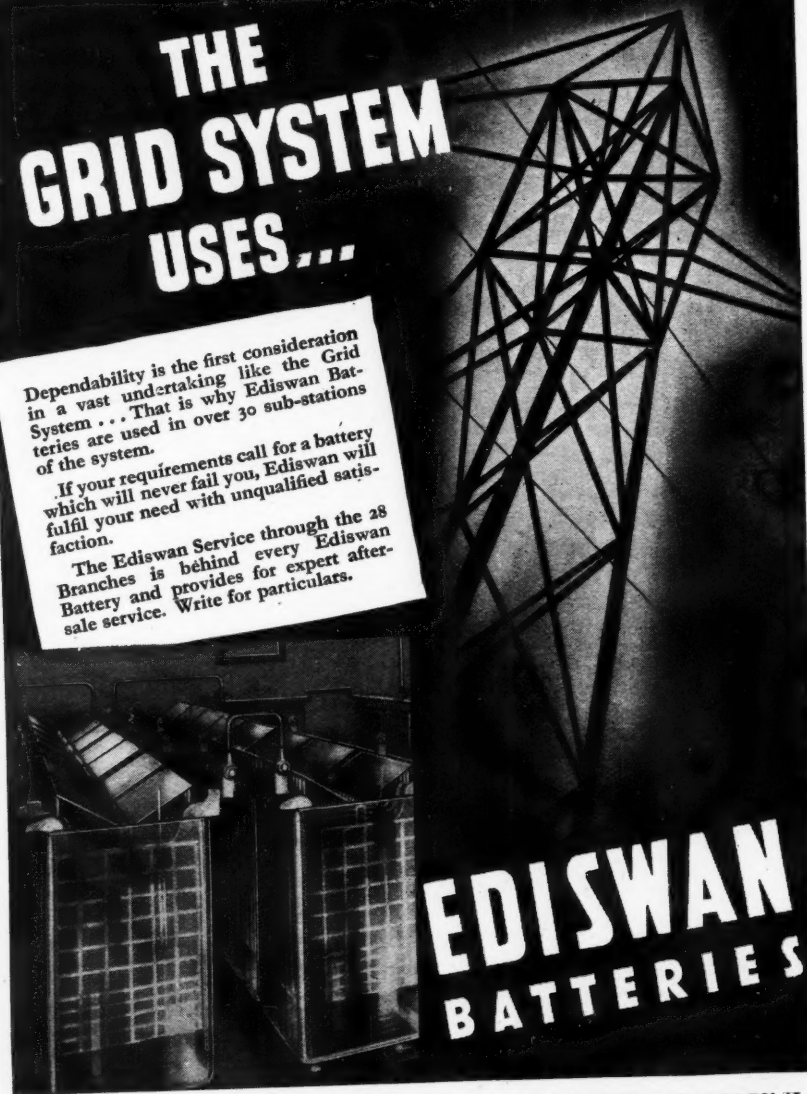
THE GRID SYSTEM USES...



Dependability is the first consideration in a vast undertaking like the Grid System . . . That is why Ediswan Batteries are used in over 30 sub-stations of the system.

If your requirements call for a battery which will never fail you, Ediswan will fulfil your need with unqualified satisfaction.

The Ediswan Service through the 28 Branches is behind every Ediswan Battery and provides for expert after-sale service. Write for particulars.

EDISWAN BATTERIES

THE EDISON SWAN ELECTRIC CO. LTD., PONDERS END, MIDDLESEX

EL.9

12

Masters of Craftsmanship

10

THOMAS TELFORD 1757-1834

The stone-mason who became the famous builder of roads, canals, bridges and harbours. His name is associated with Menai Suspension Bridge, the Ellesmere and Caledonian Canals, and with the rebuilding of many Scottish harbours. He was responsible for the construction of some 900 miles of roads and over 100 bridges in Scotland alone, apart from an immense amount of other public work.

Truly a master-craftsman who was, by his inspiring powers, a ***Master of Craftsmanship.***

9

In the electrical sphere Ferranti Ltd. justify the title—*Masters of Craftsmanship*. Throughout the world the name stands for acknowledged supremacy in performance.

Ferranti Clocks provide a typical example ; in thousands of homes, factories, offices and institutions, they are relied upon for split-second accuracy.

FERRANTI Clocks

FERRANTI LTD. HOLLINWOOD, LANCASHIRE

London: Bush House, Aldwych, W.C.2

Because PREMIER is, for obvious reasons, severely restricted in the production of its own Fine-Quality, it presents some little gems of fine quality from the books of our day

Back-Ache!

The trouble with Nat is, he suffers from back-ache, and early this week an attack seized him. He asked Joss if he'd any piece work to let, and, as we'd no swedes to let, Joss offered him a job filling muck. Nat took the job on at one shilling a load to fill and empty. He worked hard on Monday and got nine loads to the field. Joss complained about the size of the loads, so on Tuesday Nat put a bit more on and took eight loads. On Wednesday he filled seven loads. Then a sévere attack of back-ache drove him home. Since then, Pinfolds has not seen him.

"On Friday," said Tom, "some'dy recommended Mrs. Day to try Sloan's, so she got a bottle and she persuaded Nat to lay on his belly while she doctored him. She turned his shirt up as he lay abed and poured most o' the liniment on his back. Then she rubbed. Language! I ne'er heared a fellow cuss so much i' my life. Neighbours called their childer in fra' play and shut their doors, while Nathan tore around the back yard wi' nowt on but his shirt, cussing and raving like 'e 'd gone off his rocker."

Which may be true or may be partly true, for you know what Tom is at spinning a tale.

From "LIFE ON THE LAND" by Fred Kitchen. (Reproduced by kind permission of the publishers, J. M. Dent & Sons Ltd.)

PREMIER *Fine-Quality*

electric heating appliances, including the famous "Laundwell" and "Smoothwell" electric irons; "Quickset" and "Pylon" electric kettles; electric fires; toasters; coffee percolators; multi-boilers, glue-pots and other appliances.

PREMIER ELECTRIC HEATERS LIMITED · BIRMINGHAM, 9

No. 2

TANGENT

"Tangent" Products include

SOUND SIGNALS
LUMINOUS CALL SYSTEMS
STAFF LOCATORS
MINING SIGNALS
FIRE, BURGLAR AND
BANK RAID ALARMS
TELEPHONES
INTERPHONES
WATCHMAN'S CLOCKS
ELECTRIC
IMPULSE CLOCKS
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STRIKING, CHIMING AND
TOLLING MECHANISM
LIQUID-LEVEL
INDICATING
RECORDING AND
ALARM APPARATUS
IDLE-MACHINE AND
OUTPUT RECORDERS
SPECIAL APPARATUS

CONFIDENCE

is the keynote on which the reputation of "TANGENT" Apparatus has been built. Expertly designed and of sound construction, it commands confidence—for 70 years it has held a pre-eminent place in the Electrical industry and has gained confidence. "TANGENT" Apparatus is fulfilling many important duties and will continue to contribute to the progress of Industry.

For priority work good deliveries can be given.

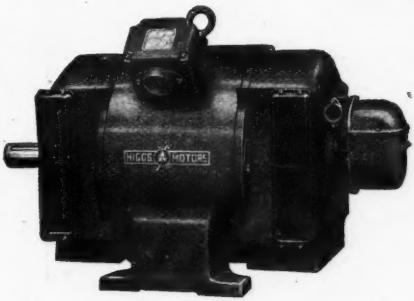
GENTS OF LEICESTER ESTAB. 1872

GENT & CO. LTD., Faraday Works, LEICESTER

Also at LONDON • NEWCASTLE-ON-TYNE • GLASGOW • BELFAST • DUBLIN

They Shall Stand
VULCANISED FIBRE LTD
Broadfords Mills
GUILDFORD . . . ENGLAND

TRADE MARK
HIGGS MOTORS
GOVERNING DIRECTOR WALTER F. HIGGS, M.I.E.E. LTD.
BIRMINGHAM, 6 ENGLAND

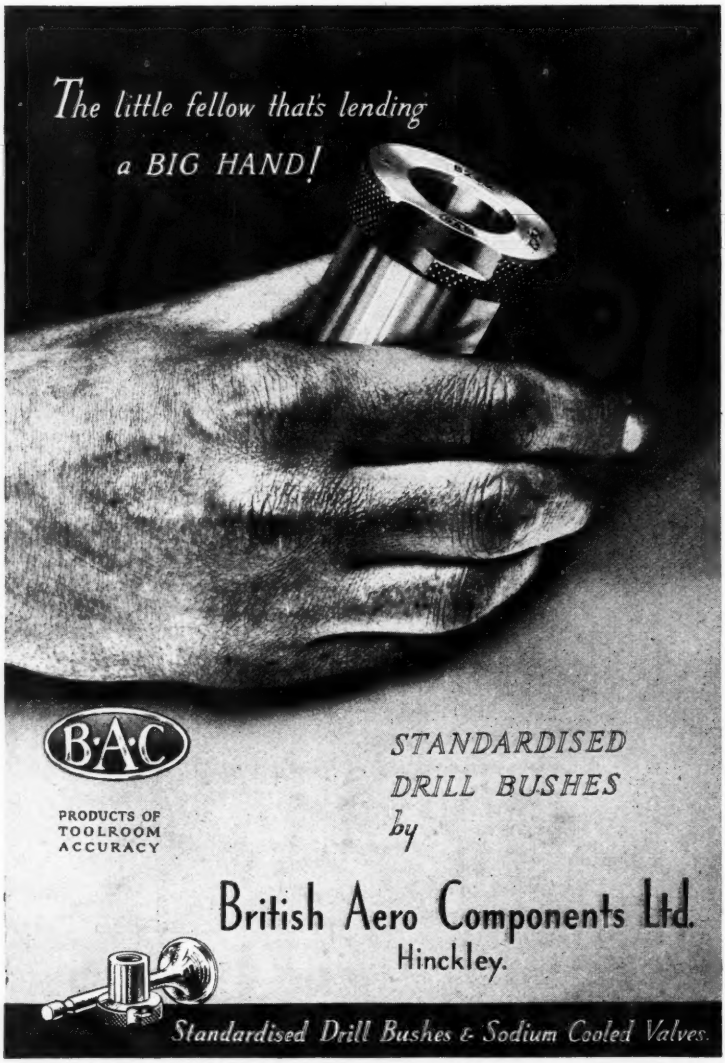


CONSISTENT QUALITY

Margarine for butter, saccharine for sugar—these are wartime substitutes which, for the "duration" at least, we are content to tolerate.

Fortunately, there is no need to accept any inferior alternative to HIGGS MOTORS, which retain their excellent pre-war standard in every respect.

Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Nottingham, Peterborough, Sheffield, Wolverhampton.


The little fellow that's lending
a BIG HAND!
B·A·C
PRODUCTS OF
TOOLROOM
ACCURACY
STANDARDISED
DRILL BUSHES
by
British Aero Components Ltd.
Hinckley.
Standardised Drill Bushes & Sodium Cooled Valves.

WHAT'S THE DIFFERENCE —ANYWAY ?

Tru-Wel Electrically Welded Steel Tubes bring to engineering and industry two factors of immense and growing importance—speed of production and saving of skilled labour. Tru-Wel Tubes, made by Tube Products Limited can be manipulated into standard unit-shapes by a few simple and speedy processes, saving time, expense and man-hours. Concentric, accurate to a few thousandths of an inch, rigid, light and with an unblemished surface, Tru-Wel Tubes can be put to uses limited only by the bounds of man's ingenuity.

THAT'S THE DIFFERENCE

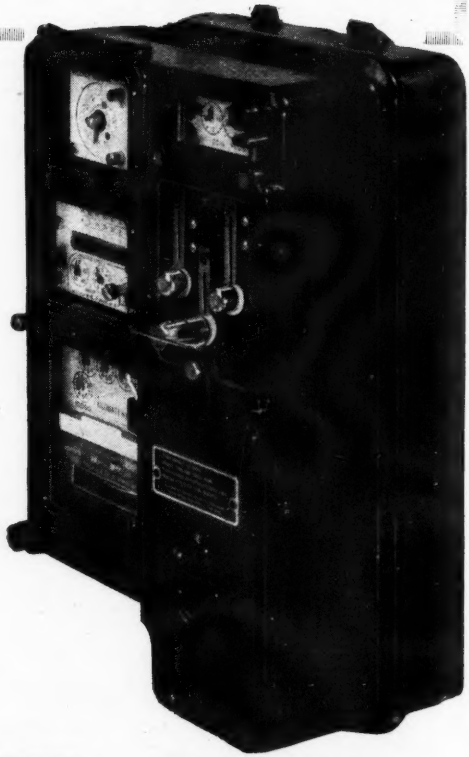
TUBE PRODUCTS LIMITED

TUBE INVESTMENTS LIMITED STEEL TUBES ADVISORY CENTRE, ASTON, BIRMINGHAM. Manufacturers who need advice or information on any job where steel tubes might help, will find The Steel Tubes Advisory Centre ready to assist them in every possible way.

T.6E

The wisdom of the long view

The wise man, in these days of short supply is the man who takes the long view. For example, we know, whatever your prepayment meter requirements may be, that there is a Smith Meter which exactly meets them. But the materials needed to make Smith Meters are in urgent need today for purposes which must be given priority. We may not therefore be able to fulfil your orders. Nevertheless we invite you to discuss your meter problems with us *now*. You will then be among the first to receive supplies the moment they are available. On the other hand, if you are already a user of Smith Meters, the years of service which they are made to give, will see you safely through these times.



TYPE 'APF' PREPAYMENT METER
With the rapid growth of the two-part tariff system it was necessary for us to introduce a Prepayment Meter which, whilst retaining the advantages of the Type 'PP' Meter could, with the addition of a fixed charge collector, be adapted for two-part tariff purposes. In addition to the many features already outlined in previous announcements the meter is offered suitable for one, two, or three-coin operation.

SMITH VARIABLE TARIFF PREPAYMENT **METER**

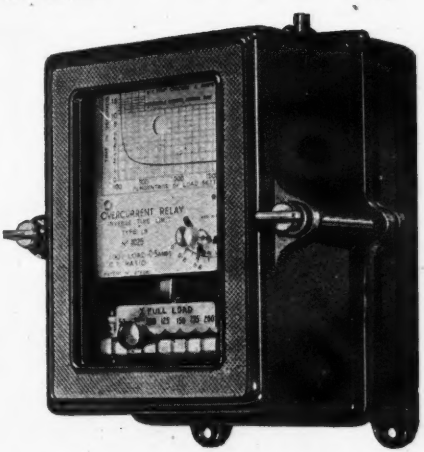
Manufactured under Smith and Angold Patents.
Smith Meters are fully approved by the Electricity Commissioners.

SMITH METERS LIMITED, LONDON, ENGLAND

Agencies in South Africa, New Zealand, Australia, India, Ceylon, China and Turkey.

Give full protection

to your generators, Transformers, Transmission Lines, Busbars, Feeders, Motors and other Electrical Plant by installing Nalders "L" Type Relays which prevent damage or breakdown due to faults of various kinds, and maintain equipment in efficient operation.



Type "L" Non-Directional Overcurrent Relay with inverse and definite minimum time characteristics

NALDERS L TYPE RELAYS

- TYPE "Lc" Overcurrent Non-directional.
- TYPE "La" Sensitive Earth Leakage.
- TYPE "LI" Reserve Current (or Power).
- TYPE "NL" Directional Overcurrent.
- TYPE "ENL" Directional Earth Leakage.
- Single, Double and Triple Pole patterns for horizontal or vertical mounting.

Quotations on request.

NALDERS RELAYS are supplied in a complete range of models. They are of outstanding quality, having high torque, low energy consumption and a wide range of adjustable settings. The Relays are vibration and surge proof, and are fitted with reliable contacts and operation indicators. They occupy small panel space.

Nalders Relays are in service in leading Power Stations and in all parts of the Globe

NALDER BROS. & THOMPSON LTD.

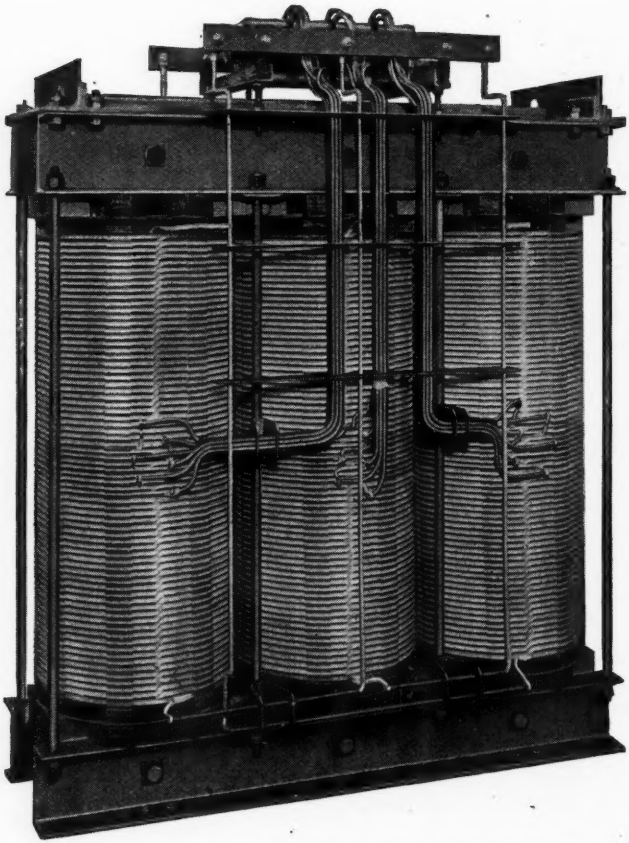
Telephone : Clissold 2365 (3 lines)
Telegrams : Occlude, Hack, London

DALSTON LANE WORKS, LONDON, E.8

MANUFACTURED BY

BRITISH POWER

TRANSFORMER CO. LTD.



1,000-kVA Power Transformer for a Dominion Government

PLEASE ADDRESS ENQUIRIES TO :

Phone : Howard 1492

Grams : "Vitrohm, Enfield"

QUEENSWAY, PONDERS END, MIDDX.

(T.3)

THIS FAN IS NEWS!

"AEROTO" PATENT

CAN HANDLE 1,000,000 CUBIC FEET OF AIR PER MINUTE STOP MANUFACTURED BY DAVIDSON & CO

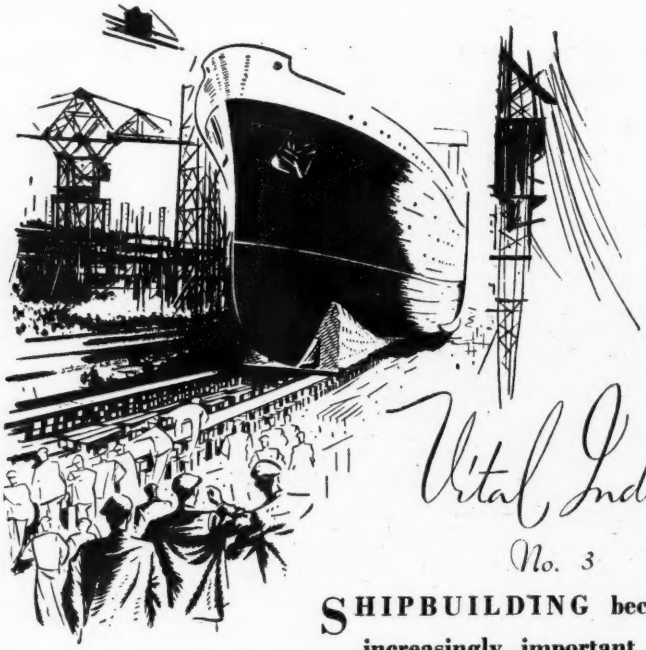
"AEROTO" SINGLE STAGE PATENT SCREW VENTILATING FAN

MESSRS. DAVIDSON & CO, LIMITED, Sirocco Engineering Works, Belfast, have recently completed a contract for an "Aeroto" Single Stage Patent Screw Ventilating Fan. This Fan, which is destined for work of national importance, has been so designed that it is capable of handling a volume of *almost one million cubic feet of air per minute;* in fact it handles as much air per minute as a town with a population of 4,000,000 persons will inhale in the same time.

This well-known Firm of Fan Makers also manufacture a wide range of products under the trade mark "Sirocco," such as Air Conditioning, Ventilating and Heating Plants, Dust [illegible] and Collection Equipment, Steam Removal [illegible] Pneumatic Conveying Installations, [illegible] Draft and Flue [illegible] Collection

TRADE MARK SIROCCO Davidson & Co. Ltd., *Sirocco Engineering Works*, Belfast TRADE MARK AEROTO

LONDON MANCHESTER LEEDS BIRMINGHAM NEWCASTLE GLASGOW CARDIFF DUBLIN



Vital Industries

No. 3

SHIPBUILDING becomes an increasingly important need for Britain's demands in the extended conflict, despite the stupendous maritime programme of our American allies.

The speed-up in production must not impair that old British soundness in every detail of construction and equipment and the vital contribution of wires and cab'es for electrical services can be used with safety and confidence only if they reach the most exacting standards.

LIVERPOOL CABLES

LEC

THE LIVERPOOL ELECTRIC CABLE CO., LTD.,
LINACRE LANE, BOOTLE, LIVERPOOL, 20

ALL ROUND THE CLOCK...

General Drilling, Fettling Castings, Tool Grinding, Screw Driving, Nut-setting, Dressing Welds, General Sanding, Polishing, Filing, etc., etc.

"WOLF" electric tools are built to severe manufacturing specifications in order that the maximum work-hours per machine are obtained. If you are faced with any problem involving the use, or possible use, of electric tools, phone or write for a "Wolf" Technical Representative to call. The "Wolf" organisation's forty years' specialised experience is always at your service.

there's work for

Wolf Regd. *Portable* ELECTRIC TOOLS

S. WOLF & CO. LTD., PIONEER WORKS, HANGER LANE, LONDON, W.5. PERivale 5631-4

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GLOVERS CABLES

for

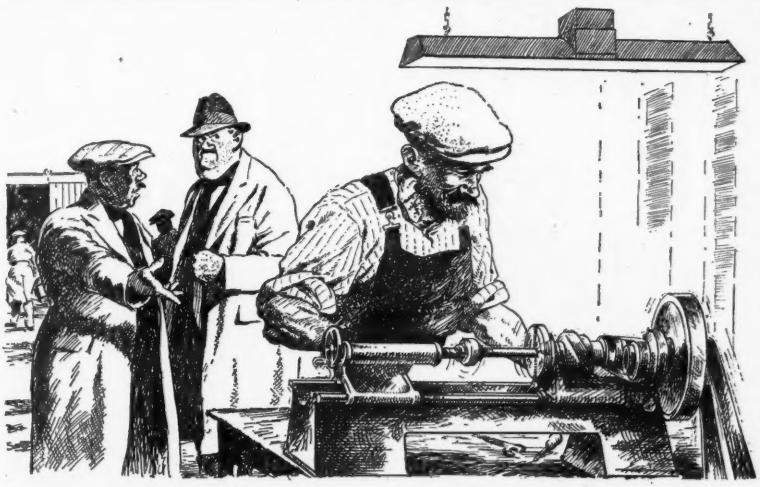
POWER

TRACTION

LIGHTING

W. T. GLOVER & CO. LTD.

TRAFFORD PARK, MANCHESTER 17



"HE HASN'T BEEN HOME ALL THIS WEEK. HE WON'T BELIEVE IT'S NIGHT SINCE THEY PUT IN THESE NEW MAZDA FLUORESCENT LAMPS"

Workers who can see what they are doing, and who know that what they see is well done, are not likely to slacken in their efforts. B T H Light-Conditioning provides the perfect visibility and happy atmosphere which enable maximum production to be maintained through the longest working hours.

Let B T H Lighting Engineers help you to plan efficient lighting for production and welfare.

MAZDA Lamps
with MAZDALUX Equipment

M3952

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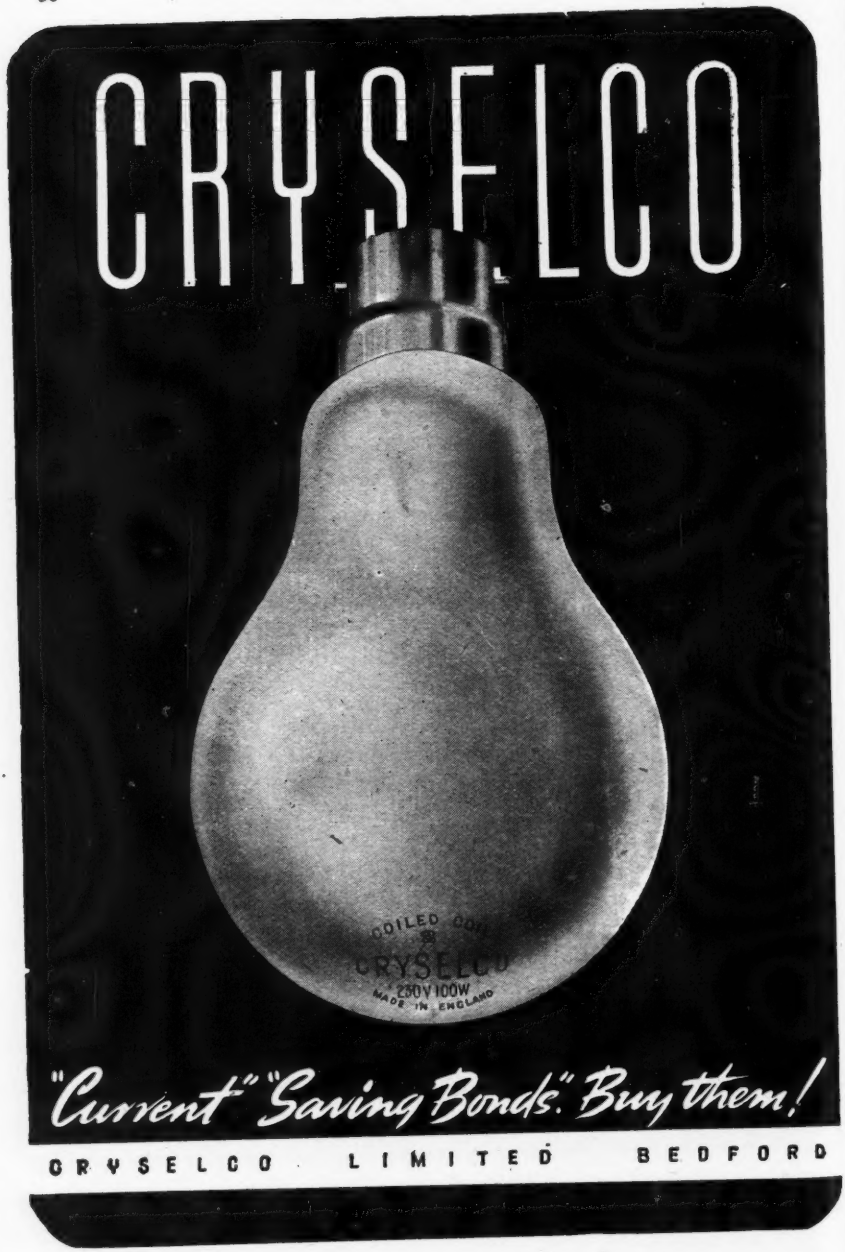
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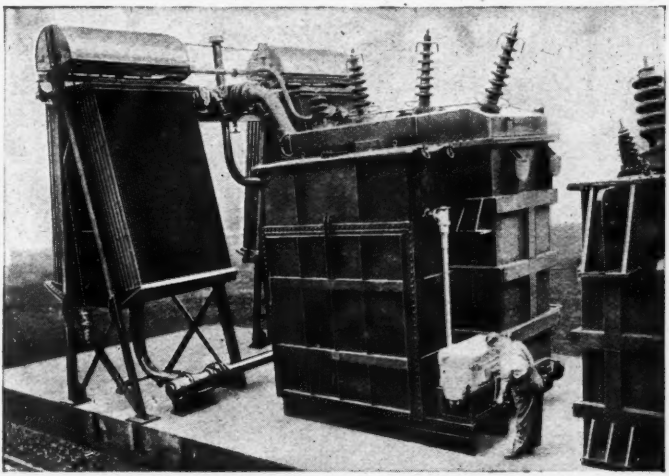

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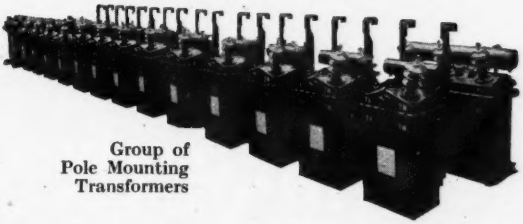

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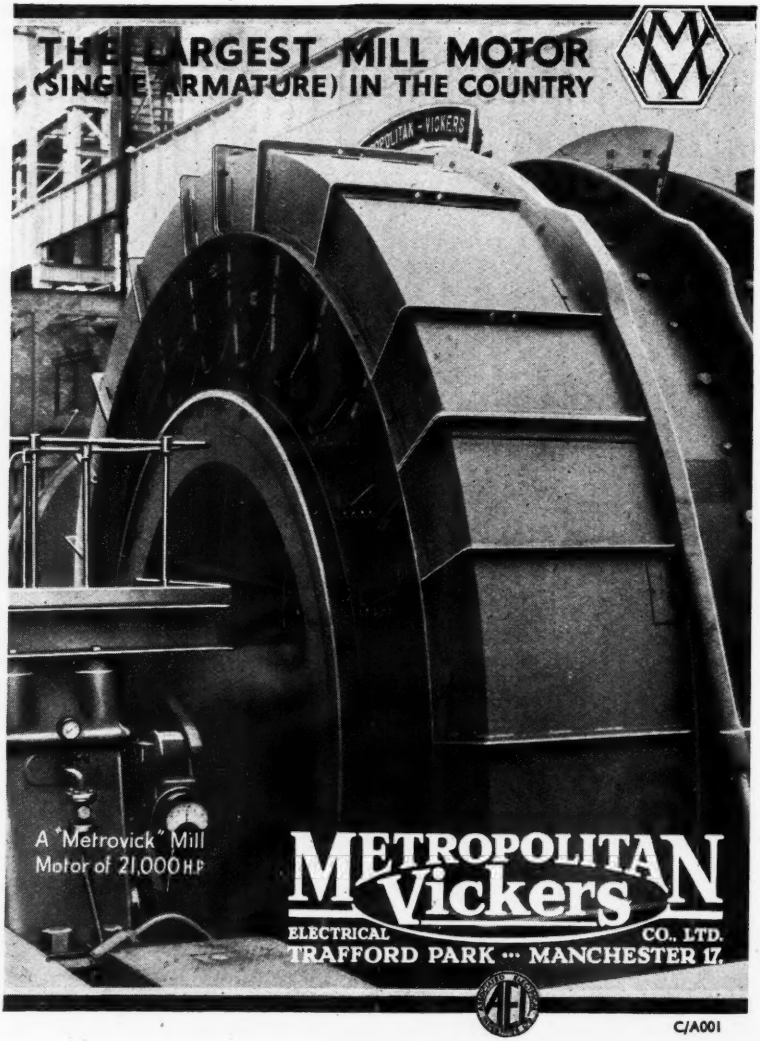

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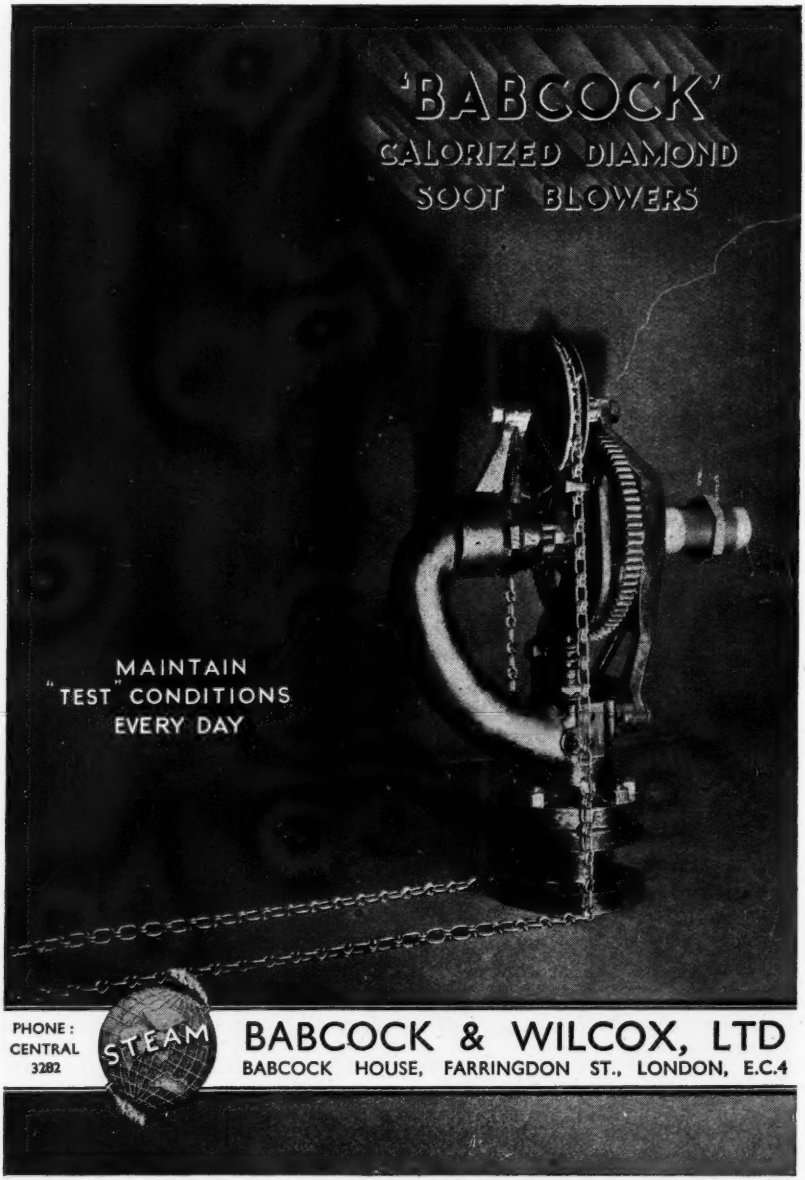
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ELECTRICAL REVIEW

Volume CXXXI — No. 3371

Friday, July 3, 1942

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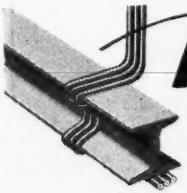

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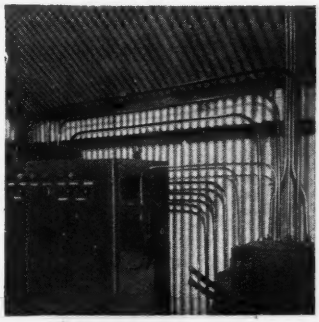

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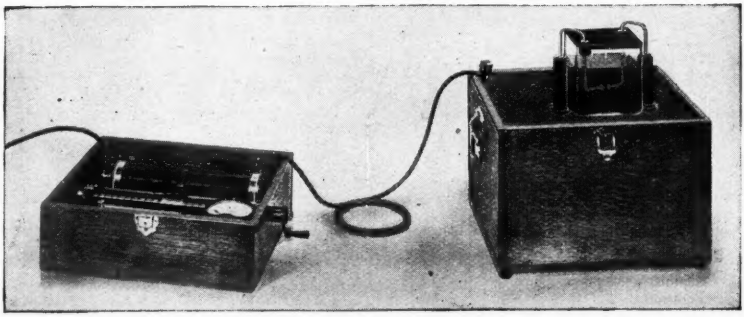

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ELECTRICAL REVIEW

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Vol. CXXXI. No. 3371. JULY 3, 1942 6d. WEEKLY

A.C. Distribution

Safety Considerations

As a logical outcome of its outstanding advantages, the three-phase four-wire system of AC distribution has been adopted in almost all the larger centres of population throughout the world. In Great Britain, in the year before the war, more than half of the undertakings were supplying AC entirely (the proportion having increased rapidly in recent years), whereas DC was supplied exclusively by only 5 per cent. of the total number. The remainder of the undertakings provided both AC and DC; the former greatly predominates and is being adopted for extensions, DC sections being changed over as rapidly as finance permits.

In the great majority of large cities in Europe and the self-governing Dominions, a voltage of 230 or 220 between phase and neutral is now standard, but other voltages are frequently retained in use during the transition from earlier practice. Thus only twenty-two out of nearly 600 British authorised undertakings afford supplies at less than 200 V.

Commissioners' Requirements

In this country the Electricity Commissioners require all new undertakings to have 400/230-V AC systems and consistently encourage the changing-over of existing non-standard networks. Some two-thirds of the authorised undertakings in this country are publicly owned, so the safety aspect is likely to receive due consideration.

Statistical lists of systems and voltages declared in thousands of localities cannot differentiate between the relative proportions of their usage and it is no doubt very difficult for those geographically remote from the scene to obtain an accurate perspective. In a paper read before the Bengal Electrical Contractors' Association on "Safety of Electrical Installations in India," Mr. G. S. Mitta cites several cases in Europe where 100 V is used in order to support a plea for the general adoption in his own country of DC at 220 V or AC at 100 V on safety grounds. He states, for instance, that 100-V DC is used in the heart of the City of London. This system is, however, only a small and isolated historical relic, and in several other of the European examples quoted AC voltages above 200 to earth are also employed.

Tropical Conditions

To criticise the statistics used as illustrations is not to ignore the difficulties that face installation engineers in ensuring reasonable safety in many parts of India on account of atmospheric humidity and tropical conditions of life generally. It would, however, in our view, be most unfortunate if Indian engineers lent the weight of their authority to give DC distribution a new lease of life. A voltage of 220 on DC circuits is only the equivalent in peak value of 150 V on AC, which would not procure immunity from all risk. In the *Journal* of the Association of Engineers (Calcutta), the issue of which containing the paper under discussion has just reached us, the Editor (Mr. S. Basu) is, we believe, on sounder ground in suggesting the use of transformers where necessary for safety to

reduce the existing AC voltage, as is the practice in other countries where exceptionally damp conditions prevail. Mr. Mitta does not make any reference to the possibilities of all-insulated apparatus or to the use of earth-leakage protection for reducing the shock potential to 40 V; but we are in agreement with his other proposals, especially those relating to checking the earthing system at least once a year, using only good-class apparatus, entrusting work only to qualified electrical contractors and spreading knowledge of methods of resuscitation.

Automatic Sootblowers

IT seems probable that for some time ahead anything honoured by the name of coal will have to be accepted for generating electricity. This provides an additional argument for automatic sootblowing, but the case presented by Mr. R. J. Glinn at the Institution of Electrical Engineers has more weight than that due to present conditions. Although the colliery is undoubtedly the place where the bulk of the incombustible should be removed, there is likely to be an increasing justification for the installation of on-load sootblowers, such as the electrical sequentially operated types now in service. Large modern boilers are particularly susceptible to fouling, but at the same time there is a greater need for availability over long periods with high heat transmission efficiency.

Wear and Tear

STEPS are being taken by electricity supply authorities to secure from the Inland Revenue Authorities an increase in the wear and tear allowances for machinery and plant. Wartime conditions—continuous long-period running, the difficulty of ensuring proper maintenance and other factors—impose a very serious strain on plant and speed-up depreciation. In the case of manufacturing plant, which may be handled by less skilled men and women, the deterioration may be even more rapid and the argument for better allowances is proportionately strengthened. The question was raised by Mr. W. J. Terry at the annual meeting of the London Electric Wire Co. & Smiths, Ltd., last week and it is to be hoped that there will be proper recognition of the situation, as there was during the last war.

Anti-Waste Order

MAJOR LLOYD GEORGE, the Minister of Fuel and Power, in a broadcast last Sunday, expressed the view that the necessary saving in fuel consumption could be secured by voluntary means although the arrangements for instituting a rationing scheme were being proceeded with as a necessary precaution. He urged the utmost economy and efficiency in the use of coal, gas and electricity upon both domestic and industrial consumers and mentioned the issue of an anti-waste Order making it an offence to use fuel uneconomically. Such an Order can only be applied to the most flagrant cases; much will still be left to goodwill and common sense.

Economy and Charges

THE General Purposes Committee of the London and Home Counties J.E.A. in a report presented to the Authority yesterday (Thursday) refers to the possibility of consumers requiring to change over from a two-part tariff to a flat rate as a result of economies in consumption. It was said that the Authority had had arrangements in existence for some time to meet such requirements with due regard to the Authority's standing costs. The Committee pointed out, however, that there could be no question of reducing the fixed charge component of the domestic two-part tariff as this was designed to cover the fixed costs which, so far from being reduced, tended to increase.

Rubber Supplies

PROBABLY the most serious effect of the Japanese occupation of Malaya and the East Indies has been the loss of the greater part of our supplies of rubber. In the House of Commons last week the Under-Secretary for the Colonies outlined the measures that are being taken to meet the requirements until the American synthetic rubber industry gets into its stride. How far the results will close the gap is uncertain but in any event the strictest economy has to be observed by all users, among which the electrical industry is not the least, and every bit of rubber that can be reclaimed must be collected and handed over to the nearest depot. It must be remembered, too, that the term "rubber" includes ebonite.

Steelworks Plant

The Influence of Mechanical Handling

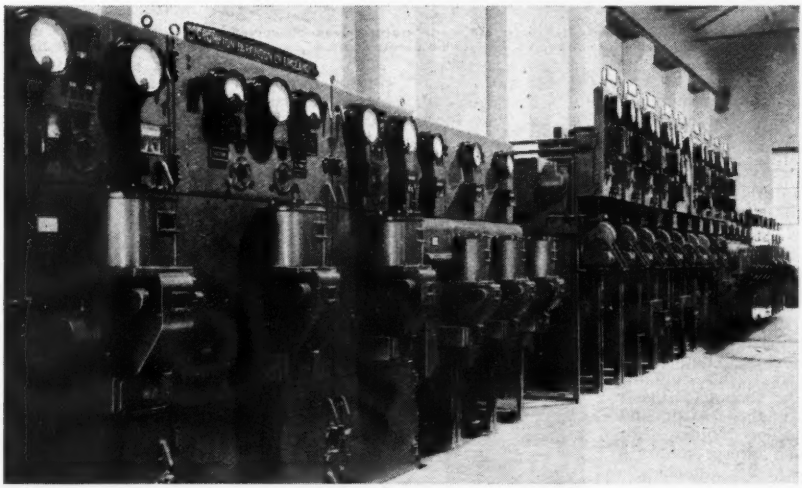
AT a large iron and steel works we recently saw oustanding examples of expansion of production effected by modern materials handling plant, both in the actual production of steel and in the casting of the works products.

The raw material, mainly scrap, is received in a large bay served by four overhead travelling cranes, two of which are used exclusively for scrap distribution for which lifting magnets are employed. The magnets are of the circular type loaded at 9 kW and receive DC at 220 V from a 15-HP motor-generator set supplied by the normal works distribution system at 550 V, three-phase, AC. Each of these two magnet cranes has a capacity of 7½ tons and employs three motors for the travelling, traversing and hoisting motions, the sizes being 20-HP, 7·5-HP and 50-HP, respectively. The other two cranes are each of 10 tons capacity and are employed for charging the cupolas in which the raw material is first smelted. There are three motors on each of these larger cranes, namely 20-HP for travelling, 7·5-HP for traversing and 70-HP for hoisting.

All the crane motors are English Electric AC slip-ring steelworks type equipments and they are all fitted with inductive time-limit control to ensure smooth and efficient operation, the control being effected from the crane driver's under-slung carriage on each crane.

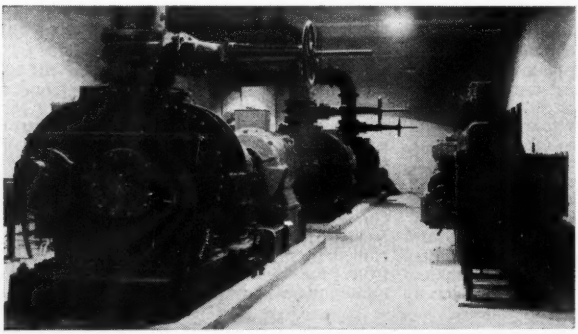
Each of the cupolas has a capacity of 15 tons and is served with blast air from a motor-driven blower situated with the other cupola blower sets and the electrical control gear in a separate room. Each blower will supply 18,000 cu. ft. of air per minute at 1 lb. per sq. in. and is driven by a Laurence, Scott 190-HP, 550-V, 3-phase, variable-speed AC commutator motor with a speed range from 500 to 1,000 RPM. Each motor is controlled by an automatic induction regulator from the actual cupola platform. The molten metal is transferred from the cupolas to rotary furnaces and converters for refining by means of a 75-ton, four-motor overhead crane, the travelling, traversing and hoisting motions being of 40-HP, 30-HP and 150-HP, respectively.

Each of the converters has a capacity of four tons and for the whole of the converter plant there is an air-blowing installation separately housed and similar in most respects to that for the cupolas, except that each blower delivers 5,000 cu. ft. of air per minute at 6 lb. per sq. in. to its particular converter and is driven by a 50-HP commutator motor with a speed range of 500 to 1,000 RPM



Main incoming and works distribution switchboards

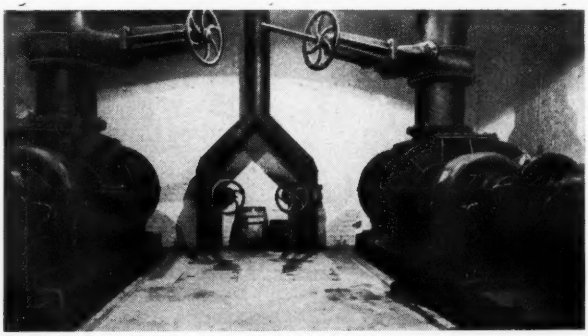
There is a similar blowing installation for the rotary furnaces, and the Igranic contactor control equipment for each furnace comprises a contactor panel and auxiliaries for the following motors: One 22½-HP, 550-V, three-phase, 50-cycle, variable-speed commutator motor for the blower, one 14/7-HP, 550-V, three-phase, 50-cycle, two-speed squirrel-cage motor for the rotator, and two ¾-HP, 220-V, DC variable-speed motors for the anthracite and bituminous feeders. A motor-generator set provides the DC supply for these feeder motors.



The cupolas are served with blast air from motor-driven blowers situated with the control gear in a separate room

The main control cubicle is a totally-enclosed floor-fixing panel and contains the contactor gear for the rotator and feeder motors. For the blower motor a separate panel is provided, the blower motor speed being controlled by a pilot motor operated induction regulator. Mounted on the main control cubicle are an isolating switch which isolates all the motors, including the blower; temperature indicators for the flue temperature and blower air temperature; tachometer dials indicating speeds of the anthracite and bituminous feeders, and the blower speed; a four-way control push-button for the blower motor, giving start, stop, accelerate and retard; start and stop push-buttons for each of the two feeders; four-speed regulator hand-wheels (two for each feeder) giving 50-150 RPM by potentiometer control varying the voltage applied to the armature of the motor, and 150-300 RPM by shunt field control. There is also a six-way push-button for the rotator motor for the following operations:—Start, stop, tap forward, tap reverse, full rotation and half rotation. A special four-pad screw-operated limit switch for limiting the travel of the rotator provides forward and reverse half-travel and forward and reverse full travel variation of the total amount of travel is obtained by adjusting the pads by means of a handwheel. A 10-in. solenoid-operated magnetic brake serves the rotator motor.

The contactor gear embodied in the main panel includes, for the rotator motor, two d.p. mechanically interlocked reversing contactors, two triple-pole mechanically interlocked speed-selecting contactors, one triple-pole contactor for short-circuiting the primary starting resistance and six overload relays, three for each speed. For each of the feeder motors there are one d.p. main contactor, one adjustable magnetic overload relay, one cross head type potentiometer pattern and one crosshead-type shunt field regulator, one vibrating relay to ensure full field at starting and to gradually accelerate the motor from the full-field speed to the pre-selected speed.



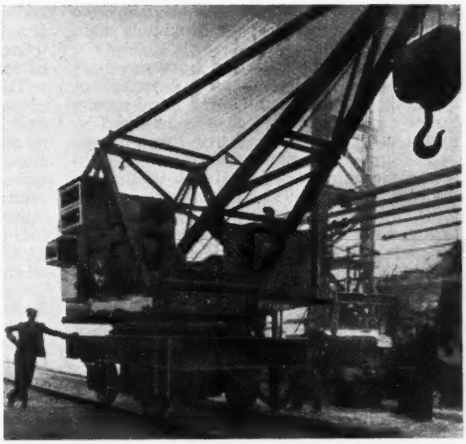
Each of the converter blowers delivers 5,000 cu. ft. of air per minute and is driven by a 50-HP commutator motor

To operate the blower motor the "start" button is pressed, closing the main contactor (an interlock is provided on the induction

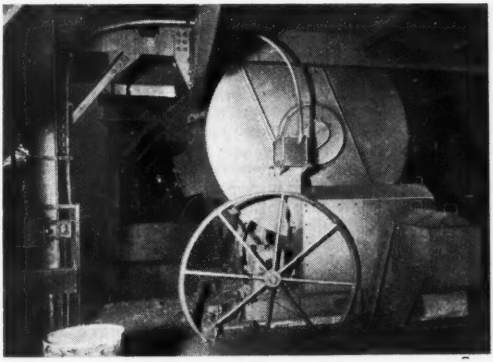
regulator to ensure that this is in the low speed position before the contactor can close). This contactor then maintains itself until the "stop" button is pressed, or an overload occurs. Pressing the "accelerate" button energises one of the pilot motor contactors and the blower motor speed increases until either the button is released or the top limit switch operates. Pressing the "retard" button energises the other pilot-motor contactor, reversing the pilot motor and decreasing the speed of the blower motor until either the button is released or the bottom limit switch operates. If the stop button is operated or the motor main contactor opens, an interlock on the contactor energises the pilot motor retard contactor, bringing the regulator to low speed for restarting. When starting the rotator, the operator, having decided whether full or half travel is to be used, operates the appropriate push-button which ensures the correct limit switch being in circuit.

On pressing the "start" button the forward and high-speed contactors close, and so does a control relay to maintain the circuit. The motor starts in the forward direction at high speed with the starting resistance in series. After a time interval, governed by a pneumatic timer, the resistance short circuiting contactor closes and cuts out the starting resistance. When the limit of forward travel is reached the "forward" and "resistance" contactors open, and after a pause, governed by a pneumatic timer, the "backward" contactor closes, reversing the motor and then the resistance is cut out. This cycle continues until the stop button is operated.

When tapping the furnace the "tap forward" and "tap reverse" buttons are used. Pressing the tap forward button energises the forward and low-speed contactors and the furnace rotates forward at low speed. Pressing the tap reverse button energises the reverse and high-speed contactors, and the furnace rotates in the reverse direction at high speed. In both operations the motor runs only whilst the push button is held depressed. Each feeder is started by its appropriate push button which energises the main contactor and the motor runs up to the pre-set speed. Hot metal is poured from the converters into three-ton ladles which are transported to the casting platform by means of a seven-ton electric travelling jib crane.



Molten metal is transported to the casting platform by a 7-ton electric travelling jib crane



Tilting arrangements of one of the converters

This crane is AC operated and runs on a broad gauge rail track with an underground pick-up from the 550-V supply to the motors of 30-HP, 30-HP and 7·5-HP for travelling, hoisting and derricking. Over the casting platform there are three 7-ton two-motor telpher cranes by means of which the ladles are conveyed to the moulding boxes. The motors are 12-HP and 28-HP for the travelling and hoisting motions.

The actual casting just referred to is effected on a continuous conveyor which is part of a most comprehensive system for the foundry as a whole and serves the sand handling and core-handling as well. The complete handling scheme has seven

sections and for each there is a multi-motor system of automatic sequence interlocking operated from lockstop control stations at many points along the conveyor routes.

The sand-handling plant, comprising 63 motor drives, is arranged in seven sequences, each sequence being controlled by a multi-motor automatic switchboard housed in dust-proof floor-mounted sheet-steel cases provided with hinged front covers and removable back covers and fitted with triple-pole main isolating switches.

The sand is first brought from the main bunkers to a sand dryer and then passed along a belt line over the numerous sand-mixing hoppers into any of which it is delivered by means of diverting ploughs on the conveyor belt. Some of the mixers are devoted to actual moulding work and each of these is driven by a 30-HP, 950-RPM slip-ring motor. Other mixers are used primarily for sand for the core-making section of the works, and each machine is driven by a 15-HP, s.c. motor and has a capacity of 500 lb. per mixing. The control gear for the complete mixing installation is built up in one sheet-steel chamber equipped with draw-out type oil-immersed circuit-breakers interlocked electrically with rotor and star-delta starters.

From the mixers the moulding sand returns to the conveyor system from which it is again delivered to the hoppers over four sand slinging machines, each handling 7·5 cu. ft. of sand per minute. The sand slinging machines receive the sand by a high-speed conveyor belt driven by a 1-HP motor which discharges on to the slinger head which is driven direct by a 20-HP, 1,500-RPM motor.

The core sand leaves its particular mixers and is passed in a similar manner to bunkers serving core-ramming machines and fixed over rotating disc feeders driven by 3-HP, 970-RPM motors. The core boxes stand on rotating tables each driven by a 3-HP 970-RPM motor and supplied with sand by the rotating disc feeder, the boxes being rammed by vertical rammers driven by a 3-HP motor.

Drying Stoves

From the core-ramming machines the cores are passed through one of a number of drying stoves, each of which is equipped with seven motors as follows: a 7½-HP, 1,450-RPM, squirrel-cage unit driving a blowing fan; two 21-HP, 735-RPM squirrel-cage units driving recirculating fans; one 7½-HP, 920-RPM equipment serving the pusher gear; and three 5-HP, 920-RPM door-operating units. The door operations are sequence interlocked electrically, so as to prevent more than one door being opened at a time, and the pusher gear propels the core carriages through the stoves. From the drying stoves the cores go by an overhead conveyor to the moulding bay for assembly in the moulding boxes.

After the assembly of the cores in the moulding boxes a top section of the mould is applied before pouring. Very soon after this the casting is stripped and for this purpose six 7½-ton, three-motor cranes span the stripping bay. The moulding boxes are then placed on core knock-outs to each of which a rocking motion is imparted by a 5-HP squirrel-cage motor in order to remove the sand.

All told there are about 200 motors employed on the foundry conveying system, ranging from 3-HP to 250-HP. Generally they transmit through reduction gears with ratio of about 5 to 1.

The incoming supply is at 11,000 V, three-phase, 50 cycles, and is taken to a nine-panel switchboard which is laid out for duplicate incoming feeders, there being a bus-section switch in between the two feeders. This switchboard feeds six B.E.T. transformers, four of which are 1,000-kVA, 11,000/550-V units feeding the motors in the steelworks and foundry, the remaining two each being 250-kVA 11,000/400/230 V equipments supplying all the lighting in the two works.

Low-voltage Distribution

There are two main low-voltage power distribution boards, both of which are of the "Klad" and fixed-cubicle pattern, all the circuit-breakers being equipped with spring-closing mechanisms. Each board is arranged to be fed by two of the 1,000-kVA transformers. Both incoming switches are of the fixed steel-cubicle pattern, with a bus-section switch in the centre. The switchboard feeding the steel-making plant has six outgoing feeders, and that feeding the foundry has nine outgoing feeders. The two 250-kVA lighting transformers feed on to an eleven-panel switchboard. This comprises three standard "Klad" panels, two of which control the incoming supplies, and the third being the bus-section switch. There are eight outgoing feeders, all of which are of the "Klad Minor" pattern. All the switchboards referred to are in the main substation, together with the three air compressors.

In addition to this switchgear there are two further boards, one in the converter blower house, and the other in the furnace blower house. The board in the converter house consists of a six-panel "Klad" board, there being two breakers controlling the duplicate incoming supplies and four breakers controlling the motors on the converter blowers. There are also three other circuits each controlled by an English Electric switch-fuse. In the converter blower house there is a similar "Klad" board of five panels, but in this case there are no switch-fuse circuits. In the case of the machine shops, the 11,000-V supply is fed to another switchboard controlling two 750-kVA Bryce transformers. The low-voltage distribution is of the English Electric busbar chamber pattern throughout.

Soot Blowers for Boilers

Recent Advances in Design

THE latest means of power-driving soot blowers for automatically cleaning the tubes of steam boilers were described in a paper by Mr. R. J. Glinn (Babcock & Wilcox, Ltd.), submitted at the Institution of Electrical Engineers in London on June 25th on the occasion of a joint meeting with the Institution of Mechanical Engineers. Sir Noel Ashbridge, president, I.E.E., asked Col. S. G. Thompson, president, I.Mech.E., to take charge of the meeting.

After examining the form of fouling within boiler tubes and its effect on different portions of the heating surface, the author described how the application of soot blowers had developed during the last twenty years, particularly the single-nozzle type. Reference was made to the design of boilers to enable fuller use to be made of the several kinds of soot blower available, since boiler ratings would in future depend upon the devising of means of keeping their heating surfaces clean.

The essential features of power-operated mechanical soot blowers were outlined, with special reference to their automatic operation, and the scope of use of the three main types was set out, each of the multi-jet element, mass element and single nozzle designs having its special role to fulfil. Consideration was also given to periods between individual soot-blowing operations and the extent of each blowing.

Review of Developments

A short history of automatic blowers included references to American and British patents of 1920 relating to a cleaner having a plurality of blowers, each with associated driving means, combined with methods of applying steam and of automatically energising the several driving heads in succession, either electrically governed or steam operated. In 1937 an installation of 33 blowers fitted at the Clarence Dock power station (Liverpool) showed that the theoretical advantages of automatic blowing were fully borne out in practice. Further development of design enabled the mounting of the driving motors and mechanical gears to be incorporated as part of the blowers themselves, instead of as added attachments to hand-operated blowers, while later improvements have satisfied modern requirements of high pressure and high temperature steam.

A new model of the pilot-operated poppet-valve type, introduced in 1939, was so designed that it could be readily adapted for either hand or electrical operation, being suitable for use with either a retractable or non-retractable blower element. As each blower was operated automatically appropriate pilot lamps on the push-button control panel provided visual indication on the firing floor.

The first large installation (36 blowers on two boilers) of the new type was put into operation in 1940 at the Newport (Mon.) Corporation electricity works. The electrical equipment represented a considerable advance on that previously employed, which depended fundamentally upon a drum face-plate controller driven by a synchronous motor which, when rotating, switched current in sequence to the various motor-driven blowers. In the system employed at Newport the drum principle had been replaced by Post Office type relays and selector switches, only one auxiliary switch being fitted on the blower head.

Detailed descriptions were provided in an appendix to the paper, which also generally indicated the trend of modern design of both electrically and hydraulically operated types of various well-known makes.

Discussion

The chairman said that the chief trouble was with the hard deposits in the tubes, and particularly superheater tubes. Research was being carried out and it was possible that the fuel would have to be treated in order to reduce the sulphur and other dangerous chemical constituents. There was the possibility of experimental plant being put down to test out different classes of fuel.

Mr. A. N. East (Electricity Commission) warned power station engineers that for the next two years at least they would have to put up with whatever coal was sent them. No boilers ordered now could be made available to deal with the load of the next two winters, and it would therefore be essential to make the best of existing plant. He would like to know to what extent automatic soot blowing would increase the dust emission from the chimneys and power stations. This was an aspect that the Commissioners had to consider before sanctioning a power station or extension.

Mr. H. S. Horsman (London Power Co.) stated that the average temperature of the ash in the p.f. furnace must be lower than with the stoker furnace and this explained in some way why the passage of 75 per cent. of the ash in a p.f. furnace had a smaller fouling effect than the 15 per cent. of ash sent to the boiler with stoker firing. Could the author mention any method, if only in principle, whereby fuels could be blended with some chemical which would put combustion in the stoker furnace on a better basis? Speaking of the fly ash as related to steam output, he said that some stokers had the knack of fouling the boiler more readily than others, and it was necessary to be very careful in dealing with over-fired air and turbulence, mentioned by the author, because there was risk of damage to the arches. If turbulence was the

aim, why not use the p.f. furnace and adopt tangential firing right away,and get the maximum turbulence? Early soot blowers, and some later designs, suffered because they had to be accommodated within boilers of long-established standard design, with poor results, and it had not been appreciated that an efficient soot blower could do very much to increase the boiler availability. Some novel boiler designs could be evolved to ensure the highest efficiency of the soot blower if the principles laid down in the paper were given full play.

Mr. S. C. Bunn referred to difficulties in operating soot blowers in plant where there were restrictions of space. Over a period of five years, the cost of maintenance of the apparatus with which he was concerned was 1.5d. per lb. of coal burned or 0.67 per cent. of the coal burned in steam required. Before the war, owing to restrictions by the local authorities concerning the grit nuisance, the apparatus could only be operated once in 24 hours, but under war conditions there had been some relaxation of these conditions. With the poorer grade fuels now used, even blowing every four hours did not keep the boilers on the line for more than 300 hours. This was due to the small combustion chamber of the boiler in question. Apart from the poor quality of coal with high ash content, there had been a peculiar effect with a first-class washed coal. With the previous coal, the boilers had been steaming fairly satisfactorily, being on the line for something like 400 hours and burning 1,200 tons of coal; they were taken off and blown with externally applied soot blowers once in 24 hours. When this Midland coal had to be used, although from the commercial point of view the coal was ideal, after two weeks with soot blowing every 24 hours and then every four hours, the boilers were completely choked and had to be taken out of service. Gun type blowers made an improvement, but the result could not be considered satisfactory. The Coal Utilisation Research Association was carrying out experiments in connection with this particular phenomenon.

An Increasing Difficulty

Mr. L. S. Fosbrooke (London Power Co.) said that this problem had become of gradually increasing magnitude during the past few years. He commended the automatic soot blower; manual operation was very inefficient. One of the biggest troubles was fouling through the superheater zone and in this connection he did not think sufficient reference had been made to a recent development in the use of water. Care must be taken not to accelerate back end corrosion and therefore everything should be done to increase the back end temperature and raise the dewpoint of the gases.

Mr. W. Wilde (London Power Co.) thought that the commercial value of soot blowing was one of the most difficult things to assess and for that reason it had not received the attention which a more clearly defined commercial value would have ensured. He would like to see development concentrated on getting a boiler which would allow the grit to fall into a trench, and the soot blowers could play their part in removing the soot from the surfaces. Water had a much greater impact on the deposit than steam and therefore had a much greater chance of removing it. It also had a chilling action which helped to crack off the deposit. He wondered whether the electrostatic precipitator with a tubular air heater had any possible future.

Mr. G. A. Plummer (Thompson Boilers) said the author in one part of the paper mentioned 36 blowers but did not state the quantity of steam taken through each blower per blow. In the case of one particular blower he believed it was 3,000 lb. per hr. per blower, and assuming that the blower operated for three minutes, this meant something like 2 tons of steam each time the boiler was completely blown. If the blower was used three times a day, 6 tons of perfectly distilled water had to be made up somehow. In the case of water lancing, untreated water was perfectly satisfactory, and that was a very big consideration in a power station.

Mr. W. N. C. Clinch (chief electrical engineer, Brighton Corporation), also remarked that it was the effective combustion of coal which would have to be considered in dealing with the problems discussed in the paper. At the present moment mechanical soot blowers were difficult to obtain, but in most boilers there were several passes where there was a change of direction and it was possible for dust which would otherwise be carried forward to be removed by quite a simple contrivance. Attention must be paid to all the composite parts making for an effective steam raising unit, and if that were done many of the difficulties would be overcome.

Soot or Ash Blowers?

Dr. R. Lessing suggested that the title of the paper should be altered from soot blowers to ash blowers, or fly ash blowers, because we were at least in the happy position that to-day soot was not produced in any self-respecting plant, or only to a very small extent. If efforts were directed to keeping out the undesirable elements from the fuel, it would go a long way towards making things easier; in fact, soot or ash blowers might not be wanted, or only in a very much simpler form.

The author, replying to some of the points raised in the discussion, said that the automatic blower probably enabled the actual blowing time to be considerably shortened as compared with manual blowing, but it was still a long period whichever method was used. One advantage was that it could be arranged to blow in sections of the boiler unit. The problem of treating fuel was not intended to be dealt with to any great extent in the paper. One of the boiler units mentioned in the paper with a chamber in front of the superheater had been at work for some time with an automatic electrically operated blower. The use of water had not so far been advocated except in dealing with the slagging formation in the superheaters, and one could not deal with soot blowing from the point of view of the boiler unit as a whole. He did not think that anyone who had had experience of the subject would say that water lancing would take the place of soot blowing; it was an expedient to deal with the slag, particularly in boilers of not such recent design. On the question of the quantity of steam used in blowing, he said the period of blowing was not usually as long as three minutes, but in many cases the amount of steam used was not half per cent. of the evaporation of the boiler. It was, however, a very large quantity in a very small time. He promised to go into the fuel question and deal with that and other matters in writing.

Insulator Design

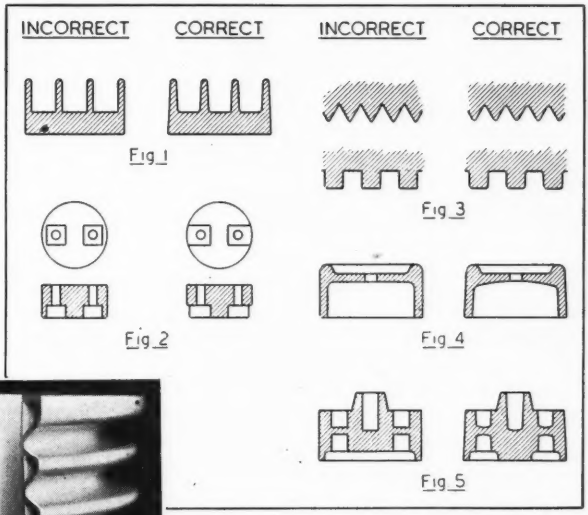
Securing Economy in Manufacture

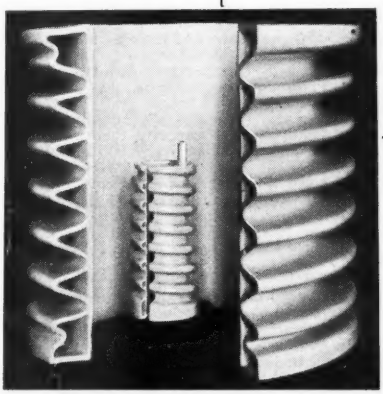
By E. Rosenthal, Dr. Ing.
(*Ceramic consultant to Bullers, Ltd.*)

IN an earlier article * the author discussed the relationship between design and manufacturing processes with a view to securing shapes in ceramic material that could be produced for the lowest costs. It was shown that porcelain and talcum bodies can be shaped by a variety of methods and that very complicated shapes can be manufactured. The following notes indicate how cheaper dies can be employed and manufacturing losses can be reduced by avoiding certain pitfalls.

It is difficult to ensure that strips of considerable length shall be perfectly flat, but the effect of any deviation can often be overcome economically without grinding the whole surface by providing any holes with bosses about 0·2 in. high, the faces of which can easily be ground dead true. Narrow fins and sharp junctions with the main body result in drying cracks and heavy manufacturing losses; sturdy fins and joints to the main body with generous radii and slightly sloping sides represent the right design (fig. 1).

Closed square slots for registering bolt heads, etc., should not be placed close to the periphery of the article because the thin wall of porcelain is a source of weakness; rectangular slots which obviate the need for side walls are just as effective (fig. 2). Where screws, bolts or plugs are fitted through plain holes in an insulator, an elongation of these holes will compensate for variations and shrinkage of the ceramic materials.





Porcelain section of a water resistor of Continental design (part cut away) for transmitters. A water coil is formed inside the hollow porcelain coil, providing a resistor and cooling the anode of the high-power valve. Owing to its complicated shape, it is produced by casting

Unfired porcelain and low-loss materials are abrasive even to special threading tools. Thus a true V thread (fig. 3) cannot be maintained in mass production, and the threading should be slightly rounded; the same considerations apply to other thread shapes. Length tolerances influence the accuracy of the thread pitch and allowance for variations in thread depth and width must be made. It is desirable to know the size of the wire to be wound into the thread of resistance formers.

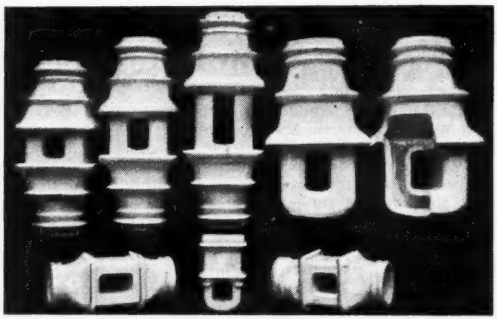
* *Electrical Review*, June 12th, 1942.

External shapes should be as symmetrical as possible and round sections are preferable to multi-cornered section. Projecting parts are best avoided. Thus, it is simpler and cheaper to provide an arrow in relief on the top surface of a disc as a direction indicator instead of a projection.

Sharp edges and parallel, perpendicular high walls are difficult to manufacture and to eject from the dies and the glaze runs off from the sharp edges, which are then transparent; it is better to provide smooth edges and to taper side walls.

A porcelain disc section of flat and uniform section throughout, would sag during firing, and an arched section with the minimum thickness in the centre should be employed as shown in fig. 4.

In the illustration (fig. 5) of an incorrect design of a much more complicated nature, the flat-bottomed holes are of cylindrical shape and have no central support for the main body. The correct design (also shown) would employ conical holes curved at the bottom and a central support for the body. The curved section at the bottom of the holes obviates sharp corners which would lead to cracks. The conical holes allow easy ejection and the bottom centre boss is provided to prevent the sagging of the main body.



Insulators for current transformers (Continental design). Such complicated and non-symmetrical shapes can only be produced by casting. Uniform wall thickness eases manufacture

Supply in Portugal

National Board's Report

THE progress of Portugal's electricity supply industry is comprehensively surveyed in the 1940 annual report of the Portuguese Board of National Electrification, Lisbon, a copy of which we have recently received from the engineer.

The report shows that the total production for the year was 460 million kWh, as compared with 448 million kWh in 1939, an advance of only 2.7 per cent. as against 5.2 per cent. in the preceding twelve months. Reversing the previous trend, the increase in output during the year under review was entirely due to steam plants, the hydro-electric production having declined slightly.

Altogether water power was responsible for 38.9 per cent. of the total output. Hydro-electric plants numbered 109 with an aggregate capacity of 83,479 kW, of which 50 (72,008 kW) were engaged in public supply. Thermal plants numbered 551 (197,341 kW), of which 126 (139,697 kW) were for public supply. Of the 176 public supply plants 148 generate AC and 28 DC. On the other hand out of 484 private electricity supply stations 253, or over 52 per cent., produce DC.

War Impedes Extensions

Owing to the war a number of planned extensions and several new projects were held up. The chief extension during 1940 was the addition of a 1,000-kVA set at the hydro-electric plant on the River Cabrum (Companhia Hidro-Electrica Portuguesa). Several small thermal plants were closed down, so that the total capacity of generating plant in the country at the end of 1940 (280,820 kW) was only 878 kW more than in 1939.

Of the total electricity output 54.1 per cent. was used for power and agricultural purposes, 23.7 per cent. for lighting, 16.6 per cent. for traction and 5.6 per cent. for electro-chemical and metallurgical industries. The average annual consumption per inhabitant amounted to only 61 kWh.

Most of the public utility generating stations are of relatively small capacity, there being only nine with plant totalling over 5,000 kW and the capacity of these nine aggregated 165,326 kW. The largest undertaking in the country is the Companhias Reunidas Gas e Electricidade, Lisbon, whose Tejo steam station has a capacity of above 51,190 kW; its output in 1940 was 121 million kWh.

Increased Use of Home Fuel

Power generated by means of Portuguese coal or vegetable fuel together with the hydro-electric plants was responsible for 58.1 per cent. of the country's total production as against 53.7 per cent. in 1939.

Owing to the increased prices and the difficulty of obtaining supplies as a result of the war, only 77 miles of new high-voltage transmission lines were constructed during the year, bringing the length of the country's system up to 3,531 miles of which 3,181 miles are overhead, mainly supported on steel masts. Finally, it may be mentioned that the number of accidents at Portuguese electric power stations reported during 1940 was 35, causing the death of 25 persons and injuries to 14 others.

Cobalt-Nickel Deposition

Developments in the Last Three Years

By C. C. Downie

RESEARCH into the deposition of cobalt-nickel alloy has developed to a considerable degree within the past three years. This alloy is at least three times as hard as nickel itself, apart from being more absolutely resistant to corrosive influences than either cobalt or nickel by themselves. Another feature of importance is that the process is within the modern category of bright plating which obviates the need for subsequent buffing or polishing.

The chief applications of cobalt-nickel deposits are to all kinds of electrical and radio appliances, automobiles, electrotypes and printing plates, and generally parts which are expected to present hard and corrosion-resisting surfaces.

The nickel used is pure wire or strip obtained by electro-refining, which provides an even purer product than is obtainable from the carbonyl process. Much of the cobalt on the market for other purposes tends to contain appreciable carbon which causes fine particles to float in the electrolyte and spoil the appearance of the deposit, besides periodically forming dull spots on the surface. This condition obtains even though the electrolyte is maintained in continuous circulation, and is pumped automatically through glass-wool filters.

Cobalt-nickel plating has many electrical applications. The author discusses methods and demonstrates the advantages over pure nickel deposition

Carbon-free Metal

For this reason the best metallic cobalt to use is that obtained by special reduction of the oxide, such as by the Kalmus process, which can be relied upon to be completely free from carbon and practically all other solid impurities. With cobalt of 99·5 per cent. purity and nickel of 99·9 per cent., a true comparison cannot be drawn in respect of deposition ratios.

For all smaller electro-deposition work it suffices to use nickel and cobalt inter-wound in the form of wire, or strip, to present a uniform surface closely akin to a solid anode. The strip is accurately weighed before being wound and the anode is generally immersed in dilute soda solution before it is introduced into the electrolysis bath to remove grease. When purely experimental work is performed, after deposition has continued for some time, not only is the electrolyte chemically analysed for nickel and cobalt contents, but a similar analysis is also made of the plated surface, while the wound anode is separated into its component cobalt and nickel strips and the latter again weighed. This checks the passage of the respective metals with the greatest precision, but it is unnecessary to go to such lengths after the regular working conditions have been standardised.

Nickel is analysed by the dimethyl-glyoxime method, and cobalt by the nitroso-beta-naphthol method. For initial experiments the cathode may be of platinum sheet, so that all features of the deposition at different current densities and concentrations of the two metals can be followed, before commencing operations. Brittleness, in the ordinary sense of the word, need never be experienced, as it is almost entirely due to impurities. The deposits can be made very ductile, so as to bend or twist without any tendency to lift or peel, while what is known as "double-plate" is rarely encountered.

It was discovered by Dr. Louis Weisberg that the inclusion of sodium formate and formaldehyde in sulphate baths causes bright deposits directly, while the blue-white colour produced in many cases does not call for any over-plate; it is a proved success as an under-coating for chromium plating, silver, gold, and other metals.

Earlier work done by Fink and Lah proved the wide range of silver-white deposits which could be obtained from different cobalt-nickel compositions, which in combined chloride-sulphate baths can contain from 55 to 75 per cent. of nickel with 45 to 25 per cent. of cobalt. At a later date Young and Gould found that the mixed bath can provide almost any desired composition of deposit at a current density of from 10 to 30 A per sq. ft. either with or without agitation. Researches by Brockman and Nowlen revealed that the density can be increased to between 32 and 144 A per sq. ft. with a different type of electrolyte.

Control of Deposition

The earlier tendency of cobalt to flake was really partly due to attempts to apply relatively thick deposits. Lavell and others claimed that cobalt alone would be more economical than nickel, because a thinner layer would afford efficient protection to the underlying metal, but despite this claim the method did not appear to acquire much

popularity, although advantage has been taken of a similar composition for the dual deposition in a bath consisting (in ounces per gallon) of 26·1 nickel sulphate crystals, 4·7 cobalt sulphate crystals, 2 sodium chloride, and 3·25 boric acid, maintained at 20 deg. at a *p*H value of 5·5 to 5·8 at a maximum of 30 A per sq. ft.

This composition makes appreciable control of the two metals possible, since if the temperature of the bath be increased the proportion of cobalt will be increased with a corresponding diminution of the nickel. Alternatively, by the expedient of increasing the speed of rotation of the cathode, the nickel proportion of the deposited metal can again be decreased.

To reduce the cobalt proportion the current density only need be suitably decreased, while by lowering the hydrogen ion concentration towards acidity the alloy deposited acquires directly an increased nickel content at the expense of the cobalt. There are thus several different factors which can be taken into account to ensure accurate control of the type of deposit secured.

Advantages of Triethanolamine

It was claimed that instead of using formates and formaldehyde to furnish a directly bright deposit, it could be obtained by addition of gelatine at a fairly high current density, but it was found that this did not permit of the same latitudes in composition variation and process flexibility. The introduction of triethanolamine makes it possible to deposit almost any proportions of cobalt and nickel.

The composition of such alkaline baths (in ounces per gallon) is 10·7 nickel sulphate crystals, 4 nickel chloride crystals, 4 anhydrous sodium sulphate, and 16 triethanolamine, together with a second solution composed of 10·7 cobalt sulphate crystals, and 13·5 triethanolamine. (The reason why so many fractions of ounces have to be used is that most workers prefer to use the metric system, which allows of more exacting variations.) In the latter instance the temperature of the bath is maintained at 23 deg. C. and the two solutions are added in measured proportions as required.

Maintaining Cobalt Content

When more cobalt is withdrawn during electrolysis than can be readily compensated for in subsequent depositions, fresh solutions have to be introduced each time for experimental work, but for large scale deposition the deficiency is rectified by the rapid means of chemical analysis employed.

Not only does the later work obviate the earlier use of cyanides, which are poisonous and dangerous to deal with on a really large scale, but triethanolamine also makes available solutions in the alkaline range for cobalt and nickel alloy compositions of almost any desired ratios.

There is little doubt that the corrosion-resisting properties of the combined cobalt-nickel deposit by far exceed those of the constituent metals, while the range of hardness, ductility, and toughness is still further increased. The last two mentioned qualities are of special importance in the plating of stereotypes, where brightness is of no great account. The printing surface is expected to withstand the effects of wear for lengthy periods of useful service without deteriorating, in which respect cobalt-nickel deposit has been of great practical value. The same type of deposit has been applied to the manufacture of rayon and other artificial silks, not to mention surfaces which are exposed to heavy wear in regular textile mills and in modern laundry practice. In various instruments, automatic machines, and the finer parts of acoustic devices cobalt-nickel deposit is preferred on account of the wide range of physical properties available.

As the cost of cobalt has prevented not a few enterprises from showing interest in it, it is worth noting that special methods have been evolved for reclaiming the metal from old and disused parts by placing them in an electrolytic bath in the position of anode, and stripping off the surface metal which is then re-used in solutions.

The advantage of direct bright plating is that since buffing or polishing machines are not necessary, modified outfits suffice which require correspondingly less labour.

Mexican Electrical Market

THE official returns of foreign trade of Mexico for the first nine months of last year show that in the electrical import trade the United States had most of the business, the only other noteworthy participation being telephone equipment from Sweden and some measuring instruments from Canada. There were no imports of telephone apparatus from Belgium or radio receiving apparatus from Holland worth mentioning, both of which made an appearance in the 1940 figures.

During the period January–September last year imports of generators and motors totalled 1,860,000 pesos in value, an increase of 400,000 pesos on the first nine months of 1940, with the United States' share at 1,530,000 pesos. The largest item, however, was radio receiving apparatus, with a total value of 7,200,000 pesos, a rise of about 50 per cent. The U.S. suppliers were credited with all the additional business. Sweden took two-thirds of the orders for telephone apparatus, the total value of which was 3,415,000 pesos, compared with 2,723,000 pesos in the corresponding period of 1940. In electrical measuring instruments there was a decline (690,000 pesos against 936,000 pesos); Canada's share in this trade declined appreciably. Imports of Japanese lamp caps and certain small appliances have fallen. The peso has been worth 1s. 0d. on the average for the past eighteen months or two years.

Increasing Boiler Output

Fuel and Other Considerations

By Vernon Walker, A.M.I.E.E.

UNDER present conditions, boilers in smaller power stations may be called upon to operate at maximum capacity and efficiency during peak-load periods. Without alteration of boiler design any attempt to increase boiler plant capacity and efficiency begins with the selection of the class of fuel to be burnt. Changing from a low-grade fuel having a high ash content and low calorific value to one of low ash content and high heating value will enable a greater load to be carried with an increase in efficiency without raising the rate of burning per sq. ft. of grate area, with the additional advantage that ash handling is reduced. The cost of steam may be increased owing to the smaller consumption of the higher grade fuel not covering the higher cost. Load factor and the value of service availability must, however, be considered.

Points dealt with include the quality and mixture of coal, slag formation on boiler-heating surfaces, scheduling of the steam demand, etc.

Another important factor, especially with stoker-fired boilers, is the prevention of segregation of coal in the bunkers and hoppers. The maximum size of the coal is of more importance than the amount of fires. The latter, however, does affect to a considerable extent the efficiency and capacity obtainable. The proportion of intermediate sizes also affects the manner in which the fuel will burn on the grate. When the maximum size is as much as 1¼ to 1½ in., ignition is likely to be slow. Delayed ignition prevents the maximum combustion rate being reached until the fuel has been carried well on to the grate. Frequently the larger lumps do not burn out completely before reaching the rear of the stoker, resulting in a high carbon loss. The larger the intermediate sizing the more this difficulty is aggravated as, with a fuel bed of large and medium lumps there is not sufficient contact between ignited surfaces to ensure combustion except at very low rates.

Correct Proportioning of Fuel

Excess air is also to be avoided as it results in low CO_2. There should be enough fines uniformly mixed with the larger lumps to provide a fairly compact bed to ensure prompt ignition. If the amount of fines is too great the air for combustion may make holes in the fuel bed and the proportion of combustible ash may be high. Satisfactory results are obtained with a top size of ¾ to 1 in., with a lower level of 60 per cent. through a $\frac{3}{16}$-in. mesh and 25 to 30 per cent. through a ¼ in. mesh. With the smaller top size ignition takes place rapidly at the coal regulating door so that maximum rate of burning is obtained by the time the fuel has been carried only a short distance on to the grate. The carbon loss is also reduced as well as that due to excess air.

A proper mixture of coal as proportioned at the mine will not always remain uniform until it reaches the stoker hoppers. The shape of the storage bunkers, slope of chutes as well as the size and shape of stoker hoppers affects segregation. Delivery to overhead bunkers should be as uniform across the bunkers as possible when filling. Chutes leading to the stoker hoppers should be disposed so that they do not deposit the coarse coal at the sides and the fines at the centre. The large pieces do not ignite unless the air pressure is low and the middle portion of the fuel will not burn satisfactorily. Travelling chutes practically eliminate segregation, provided the fault did not exist previously. Coal conveyed by barge is generally "de-sized" to a greater extent than that delivered by rail.

Size of coal and moisture content also control the requirements of the conveying and chute design. If the fines and moisture are increased above certain limits, depending on the design, the coal will arch in the bunkers and chutes, making additional labour necessary and even causing loss in capacity due to irregular feeding in the stoker hoppers.

Pulverised Coal

Regarding coal for pulverising, size and moisture may cause interruption to mill feeders by hanging in the bunkers and chutes. Large coal generally flows easily from bunker to mill, but may cause irregular feeding or jamming of the mill feeder. It also reduces the capacity of the mill.

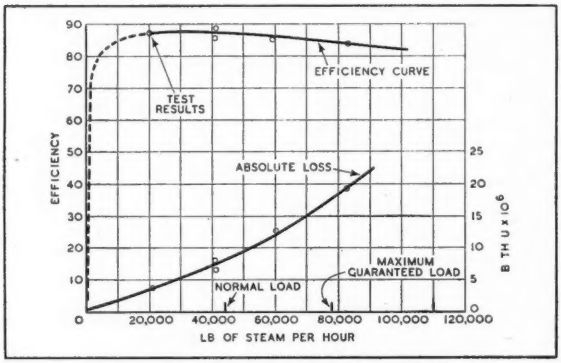
Moisture reduces pulveriser capacity and delays ignition in the furnace. The effect on mill capacity and on ignition can be minimised by supplying the mill with higher-temperature air, but little can be done to prevent hanging of the coal on its way to the mill.

Hardness also affects mill capacity and power consumption. Many hard coals having a high calorific value need not be pulverised so finely as soft low-volatile coals. Hard coals pulverise easily when dry and hot. Changes in fuel in pulverised-fuel installations also affect the behaviour of the ash with

regard to keeping the unit's surface clean.

It may be possible to mix coals of various properties so thoroughly that, once mixed, they do not have much tendency to separate. In this way a mixture of low-ash coal and a high-ash coal having a large amount of fines may give more satisfactory results than burning either coal alone. The justification of extra expense in mixing the coals will require a careful study of the actual results obtained by various mixings as they are burnt.

As the boiler capacity is directly proportional to the amount of coal burnt, and as the quantity of coal is dependent on the capacity of the boiler fans, a reduction in the amount of excess air required for combustion not only increases efficiency, but enables a greater amount of fuel to be burnt with a correspondingly greater output. This is especially important, if the fan capacity is not sufficient to deal with overloads. The proper use of boiler instruments will enable the furnace conditions to be improved.



Result of efficiency tests on a vertical-tube boiler

Removal of Slag

Slag formation on the boiler-heating surfaces is a frequent cause of loss in efficiency and capacity, often resulting in boiler outage to allow the surfaces to be cleaned of slag which cannot be removed by the usual methods while in operation. The design of the boiler and the ash characteristics of the coal burnt have a decided influence on this problem. Variation in the character of the deposits even from closely similar coals under different burning conditions tend further to complicate slag removal.

The multi-nozzle soot blower has proved satisfactory for economisers and air heaters when relatively low temperature conditions prevail. In higher temperature sections, such as water walls, the retractable soot blower is becoming more essential. Hard lancing is carried out by steam or compressed air. Water has been successfully used on generator tubes where no damage to expanded joints is likely to occur. Air or steam is, however, to be preferred for superheater tubes. Slag often reduces the heat absorption of the water walls and boiler tubes to such an extent that the increased gas temperature results in excessive superheat, which must be controlled by the use of soot blowers or hard lancing. By reducing the boiler loading to a quarter, the slag may be cracked off the water walls. Slagging may also be reduced by selecting a coal having a high-ash fusion temperature.

Loss of capacity through scale formation on the boiler heating surfaces should be avoided by competent feed-water conditioning. In recent years the use of tri-sodium phosphate and meta-phosphate has been given a great deal of attention. Both these phosphates deposit the scale-forming salts as soft sludge that can be easily blown down. Tri-sodium phosphate is generally added to the water in the boiler drum to guard against any deposits in the economisers or feed range. Meta-phosphate does not deposit calcium and magnesium salts in the feed range, and can be added to comparatively cold feed water.

Boiler-water concentrations should be kept within the limits that minimise foaming and priming and their ill effects. Other important factors are the deterioration of furnace brickwork, which is affected in some cases by the characteristics of the ash and by rapid fluctuations in temperature when bringing boilers into service, the maintenance of steam traps to avoid waste of steam and condensate, and the scheduling of the steam demand.

The last-named is of considerable importance if full output is to be obtained over a given period. If the load is thrown on to the boiler at a rate that cannot be followed by combustion conditions, the drop in steam pressure may take a considerable time to recover. If possible, sufficient load should be allotted to the units coming into service, so that combustion conditions can be stabilised for full output. The time required to maintain full rating depends on the type of plant and the time it has been out of service. For instance, with modern stoker-fired boilers, normal pressure can be raised and maximum output attained in some 12 to 18 minutes from banked conditions. With pulverised fuel or oil the time will be even shorter.

Stoker-fired units fitted with auxiliary oil burners can reach maximum output in eight minutes from banked conditions, assuming steam pressure is three-quarters working pressure. On the other hand, for boilers working with natural draught or induced draught with the older classes of stoker, over an hour may elapse before any appreciable load can be carried.

The curve gives the result of efficiency tests taken on a vertical tube type boiler having a capacity of 77,000 lb. per hr., with steam conditions of 335 lb. per sq. in., and 750 deg. F., and shows the reduction in efficiency on overload. An efficiency of 87 per cent. was obtained when evaporating 20,000 lb. per hr., but this was reduced to 83.9 per cent. with a load of 85,000 lb. per hr., and to 81 per cent. at 100,000 lb. per hr.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Production and Export

THERE are so many points in which Mr. Sills' article in the *Electrical Review* of June 5th is entirely wrong that its value is greatly reduced even if any value is left in it. Some of these points have already been commented upon but some have been overlooked or for some reason comment has been withheld.

Suppose we examine some of the advantages possessed by the existence of the small manufacturer.

1. In the bad old days when trade slumped and orders were scarce—and profits scarcer—the larger firms or groups dispensed with the services of their employees to a far greater extent than did the smaller firms.

2. The war demanded decentralisation of manufacture (as well as power generation) and orders were spread to avoid risk. If we had only four large groups and we had four "Augsburgs" what would have been our position now? We have the smaller firms to thank.

3. Purchasers invariably find it preferable to deal with smaller firms. They can and do get better attention. They are known as customers and as individuals and not merely as order numbers.

4. It was the large firms who could not agree to one national testing station and so each to some degree installed its own expensive plant for this purpose. This is no testimonial to their efficiency although Mr. Sills seems to think that it is. The small firms did tend to utilise the "communal" testing facilities and in one case several of them amalgamated their interests in this direction. Mr. Long has touched on this point in his letter published in your June 12th issue.

5. The larger the group the larger the gap between those in control and those who produce the goods; the bowels of compassion are eliminated and the democratic atmosphere is destroyed—if it ever existed. Surely the Atlantic Charter was fundamentally based on the avoidance of "gobbling up" those who are weaker. It is perhaps unfortunate that Mr. Sills made reference to this. Mr. William Briggs has dealt ably with this point in his letter in your June 19th issue.

6. The pleasing atmosphere between management, staff and workpeople of the small firms is a factor on which we can safely rely in the future to help our export business. No doubt greater efficiency is desirable and will be achieved, but we all want to retain where possible that friendly and co-operative atmosphere which is best reflected in our smaller factories by the use of Christian names by the chairman and directors to the man in the shop.

7. The large groups do excellent work—they have excellent talent—but this is not peculiar to them. Many of the smaller firms have contributed with great talent and foresight to the vast forward movement by the electrical industry during the few years prior to the war so why should Mr. Sills conclude that their reward should be to become "protected territories" by the larger powers or groups? Would this produce greater initiative or would it bring about that spirit of indifference which is by no means absent in the larger organisations?

*London, S.W.*1. D'NAR.

AS a neutral observer and not a manufacturer, but a large user of electrical plant and apparatus, I have read with interest the subject and replies by correspondents. We must not overlook the main object of the policy advocated by the author—more employment after the war, what is best for the majority and the organisation to produce it.

Negotiations are simplified by contact with larger and fewer concerns; with a multiplicity of smaller ones it is much more difficult and takes up more time.

The larger concerns possess a combination of technicians, such as engineers, chemists, research staffs, etc., who can take into account the full intricacies of problems of present and future development; the latter is of the greatest importance. International control

and representation in all parts of the world must not be overlooked. The smaller concerns must still play a useful part on smaller and repetition lines in which a high degree of research and development is not required.

I think it is generally accepted that the larger concerns have developed the social, welfare and superannuation side much more than the smaller concerns, and that although some are playing their part well, there are many others who do not provide the right conditions for workers.

Cheshire. NEUTRAL.

IN his letter in your issue of June 12th "Epimetheus" indicates that engineers should not take any view but engineering. What an unfortunate confession to make. I could demonstrate that this view must be diametrically opposed to the interests of engineers generally. How do engineers expect the public to appreciate their profession unless the public is made to realise that engineers have also a keen world outlook and are suitable persons for managerial jobs?

As I see it, engineering employment may be at a high level for a short time after the war, but I tremble to think what there is in store after that. Do let us be constructive and think. On the whole Mr. Sills has made out a good case. His statement that "we must either accept the unemployment situation which existed before the war, or adopt new measures" meets with my approval.

Warrington. PROGRESS.

NEW BOOKS

Practical Mathematics. By Louis Toft and A. D. D. McKay. Second edition. Pp. 612; figs. 167. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 15s.

Since it was first published in 1931 this book, which covers the syllabus of the B.Sc. examinations in the subject and is suitable for advanced classes in technical colleges, has been reprinted three times. The new edition gives a more general treatment of the differential equation of the second degree with constant coefficients, and, in response to suggestions by teachers, includes a set of miscellaneous examples in applied mathematics.

The Steam Boiler Yearbook and Manual. By Sydney D. Scorer, A.M.I.Mech.E. Pp. 399; figs. 271. Paul Elek, 39, Parker Street, London, W.C.2. Price 20s.

This handbook is divided into two parts and covers a very wide field of technical problems which affect the power plant engineer. The information given has been taken from many of the most recent papers presented before leading engineering societies and published articles and is generally of a descriptive nature.

Part I has nineteen chapters dealing with such subjects as heat transmission in steam boilers, mechanical design, boiler selection, pulverised fuel, oil fuel and gas firing, and feed water treatment. Part II contains the following principal sections:—Coal selection and storage, fuel economy and combustion, pulverised fuel, oil fuel, ash, design and operation, steam generation, and automatic control.

The book is well illustrated throughout, and manufacturers' products are fairly well represented in the many sections. Although some of the chapters and sections are rather curtailed, the author has endeavoured to cater for the industrial plant engineer as well as the modern power station engineer, and while most of the information is of a very practical nature, sight has not been lost of the fundamentals on which many of the main features primarily depend. Some idea of the data included will be gathered from the fact that chain grate stokers, retort stokers and pulverised fuel firing for large power stations are dealt with. Retort stokers are not nearly so common in this country as the chain grate type, and the information and references in the present volume are useful in this respect. The indices of products used by the steam engineer and the manufacturers of such products are a useful adjunct to such a volume.

The general planning of the book is good, and no doubt when we return to days of peace and conditions permit of more space greater detail will be incorporated in the chapters, which could be improved in this respect. The present volume will be found useful to the student and practising engineer as a work of reference, and also serve as an introduction to almost every type of plant and equipment associated with steam generation. It need hardly be repeated that the cost of steam production is the highest item in any power plant and it is here that the greatest savings (or losses) can be made.—T.H.C.

Wireless Terms Explained. By "Decibel." Second edition. Pp. 74; illus. Sir Isaac Pitman & Sons, Ltd. Price 2s. 6d.

A large number of additional terms have been added to bring the new edition up to date. Much of the material included appeared originally in *World Radio* in serial form under the title of "A Wireless Alphabet." Though intended primarily for the beginner the book has also proved useful as a work of reference to the more advanced student.

Electric Wiring Cables. By W. Perren Maycock, revised by F. C. Raphael. Pp. 95. Sir Isaac Pitman & Sons, Ltd. Price, 5s.

A new edition (the eighth) of this useful little work (which really is a pocket book) was called for chiefly on account of changes, including increases in current-carrying capacity of cables, that have been made in the I.E.E. Wiring Regulations. The relevant tables have been completely revised and a new table has been included to allow for the smaller size of conduit permissible with straight runs between draw-in boxes. Another new feature is a table for the rapid calculation of conductors and conduit sizes for three-phase work.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT a meeting of the Wimbledon Town Council last week **Mr. A. E. McKenzie,** chief electrical engineer of the Corporation Electricity Department, was stated to be " the second highest paid council official in the British Empire." The statement was made during a discussion on Mr. McKenzie's superannuation allowance. When he was appointed to the position in 1922 it was on the basis of a salary plus a bonus on increased output, and at the meeting it was said that the total now paid to him annually was about £4,500. The Finance Committee proposed that his retiring allowance should be £2,426.

It was contended that as Mr. McKenzie had contributed to the superannuation scheme for only fourteen years his allowance would ordinarily be less than £900, but the Corporation was legally entitled to take account of his non-contributory years and on this basis the amount would be £1,660. Alderman A. W. Hickmott, chairman of the Electricity Committee, defended the proposal, stating that other officials had been similarly treated in the past. Moreover, Mr. McKenzie had made the electricity undertaking one of the best in the country and was deserving of recognition.

Mr. McKenzie was due to retire next year, but has agreed to carry on for a further year.

Mr. W. H. Simpson has retired from the position of general engineering assistant to the city electrical engineer of Manchester after thirty years' service with the Corporation. He was previously with the St. James and Pall Mall Electric Light Co. and Belfast and Bradford Corporations. He is familiar to many power station engineers as assistant editor of the *Electrical Power Engineer.*

Mr. R. H. Shrives, senior engineering assistant in the Brighton Electricity Department, is recommended for promotion to chief engineering assistant.

Sir Edward Crowe has been elected president of the Royal Society of Arts in succession to the late Duke of Connaught. Sir Edward is a director of W. T. Henley's Telegraph Works Co., Ltd.

Mr. J. Inglis, district mains superintendent, Glasgow Corporation Electricity Department, has been appointed mains superintendent at a commencing salary of £720 per annum. **Mr. D. Hogg,** senior assistant district mains superintendent, has been promoted to the position of district mains superintendent, the commencing salary being £581 per annum.

Miss C. Polley, senior demonstrator with the Hammersmith Electricity Department, was married on June 27th at St. Matthew's Church, Croydon, to **Mr. N. Meller,** junior mains engineer and draughtsman with the Bethnal Green Electricity Department (formerly of Hammersmith Electricity Department).

The Council of the Public Service Transport Association has nominated Messrs. S. R. Geary (London Passenger Transport Board); B. Hall (general manager, Portsmouth Corporation Passenger Transport Department); W. G. Marks (general manager, Liverpool Corporation Passenger Transport Department); G. Stratton (Karrier Motors, Ltd.); E. L. Taylor (Barton Transport, Ltd.); and E. A. Wildey (English Electric Co., Ltd.), for election to fill vacancies on the Council.

Mr. A. S. Tait, former vice-president of the English Electric Co., of St. Catherines (Canada), has been appointed president of the company. He joined the company in 1934 as general manager and was appointed vice-president in 1940. He succeeds **Mr. D. H. McDougall,** who has resigned. **Mr. H. B. Norris** has been elected vice-president and **Mr. H. C. Blenkhorn,** who joined the company in 1935 as sales engineer, later becoming assistant general manager, has been appointed general manager. **Mr. V. E. North,** manager of the Co.'s district office at Toronto, has been appointed sales manager at the head office at St. Catherine's. His place at Toronto has been taken by **Mr. F. W. Mardock.**

Obituary

Mr. C. E. Midgley.—We regret to record the death, which occurred at Bradford on June 24th after a long illness, of Mr. Charles E. Midgley, aged sixty-five. He was the first electrical engineer of the City of York. He had also been with the former Yorkshire House to House Electricity Co., and was deputy electrical engineer at Wakefield, Eventually he took up private practice.

Mr. L. A. S. Wood, whose sudden death is reported from Cleveland, Ohio, was chief lighting engineer of the Westinghouse Electric & Manufacturing Co. According to *Electrical News and Engineering* he was one of the foremost illuminating engineers on the American continent and was a pioneer in promoting good street lighting practice not only in America but in England.

Mr. E. H. Ackland.—The death is reported in the *New Zealand Electrical Journal* of Mr. E. W. Ackland, managing director and founder of the National Electrical and Engineering Co., Ltd. He was born at Christchurch in 1874 and went to Australia at an early age. After a period with Mayes Bros., Sydney, and later with J. G. White & Co., Auckland, he founded theNational Electrical & Engineering Co. in 1906 at Dunedin. He was a member of the I.E.E., of the American Institute of Electrical Engineers, the New Zealand Institution of Engineers and the New Zealand Standards Institute.

Don José M. Farfan.—The death occurred recently in Madrid of Don José Morillo Farfan, one of the leading electrical engineers in Spain. He was the author of a Spanish textbook on electrotechnics which has run into several editions, and he also played an important part in developing the hydro-electric resources of Spain.

Will.—Mr. W. Summerscales, managing director of the Morley Electrical Engineering Co., Ltd., left £13,503 with net personalty of £12,380.

Retail Trade Concentration

Proposed Insurance Fund

AS a result of its deliberations extending over a period of rather more than a year the Retail Trade Committee appointed by the President of the Board of Trade has recommended that a scheme of concentration should be initiated for the whole of the retail non-food trades, as a wartime emergency measure. The aim of the scheme is to facilitate voluntary withdrawal from business during the period of emergency. To assist those who withdraw, payments would be made from a central fund to be called the Retail Concentration Insurance Fund, which would be raised by means of a compulsory levy.

The scheme is set out in the third report* of the Committee, an independent body under the chairmanship of Mr. W. Craig Henderson, K.C. The impact of the war on the trades under review was surveyed in the Committee's second interim report last January, and it is noted that since then the process of control and contraction has continued. It is felt that the cumulative effect of the consumer rationing scheme and the call-up of new age groups will weigh in the main upon the future, and the need for remedial action will grow apace.

One of the difficulties in a very complex subject was the absence of a census of distribution, but sample surveys on a limited scale were made, particulars of which are set out in an appendix. As might be expected the war "casualties" are shown mainly to be among the smaller traders. In an analysis by category the class "cycles, radio and electrical goods" includes 303 shops, a reduction of 13 per cent. having taken place on the pre-war number (stores are excluded). The Committee states that the proposed scheme would, within the limits imposed, afford traders, particularly small traders who have been hard hit, both means of present relief and a sounder hope of post-war recovery unburdened by debt. Besides making for sounder trading the scheme would be to the national interest in effecting savings in heat, light, water and man-power. It would put a sharp check on the tendency for prices to rise.

The Committee emphasises that its concern is with the effects of the war and not with inequalities which have their roots in pre-war times. Nevertheless, in so far as present remedies produce more order they will lay a sounder foundation for the future.

Compulsory Levy

It is proposed that the compulsory levy should be calculated as a fixed percentage of turnover, and for a start 1 per cent. is suggested ; this would probably enable a reserve to be built up in the early stages. It would need to be classed as a business expense for all purposes. To simplify the administration of the scheme, traders with a smaller turnover than £1,000 a year would be allowed exemption at their own option. The option to come into the scheme must, however, be exercised from the start. As a condition of continuing business, traders would have to apply for registration, but this might be temporarily waived in the below £1,000 class. It is thought that the income tax machinery would be appropriate for the collection of the levy, in view of the confidential nature of the figures. It is recommended that the agreements of the appropriate Joint Industrial Councils should be binding on all traders in the register.

The decision to withdraw could be taken at any time after payment of the first premium. Variant forms of withdrawing from business would include "marriage" with another trader by which one shop is closed, the closing of a branch by a multiple trader, or the closing of part of a department store. Only in exceptional circumstances would a trader be allowed to resume business during the wartime emergency.

Payment of Compensation

Standard benefit, to relieve the trader of continuing contractual obligations entered into before the inception of the scheme and to safeguard his tenancy rights, would be at the fixed rate of 5 per cent. per annum, calculated on the turnover of the twelve months preceding withdrawal. Payment would continue during the currency of the obligations or of the scheme, whichever is the shorter. Renewal of lease after announcement of the scheme would be inadmissible for standard benefit. It is further recommended that withdrawal under the scheme should entitle the trader to the exemption of the premises from rates even where fixtures are not removed. Any money recoverable by subletting, up to the limit of the standard benefit, would accrue to the fund.

To meet cases where the standard benefit falls short of the contractual obligations for rent, it is recommended that there should be strengthening and extension of the conciliation machinery embodied in the Liabilities (War-Time Adjustment) Act, 1941.

Alternatively, where there are no contractual obligations, or only short-term ones, a trader may be paid "special" benefit at a similar rate for a fixed period of six months, but restricted to the first £5,000 of turnover. This proposal is framed to be advantageous to the small trader. To qualify, a trader must withdraw within six months of the scheme's inception.

It is recommended that withdrawing traders should be given a certificate entitling them to prior rights (not absolute, for stated reasons) of re-entry into the trade, and where tenancy rights have been maintained throughout, to resumption of business in the actual premises. An exception is made of traders who receive a cash payment of special benefit, but a certificate would be granted where the money is left in the fund, at an agreed rate of interest. It is considered impracticable to make the scheme as a whole retrospective, but it is thought that consideration might be given to allowing similar rights of re-entry to those who have previously ceased trade on account of the war, if they had operated for at least twelve months. This qualifying period also applies to traders withdrawing under the scheme.

A number of questions arise regarding the

* Stationery Office, price 9d.

scope of the scheme, and these affect the electrical industry. Such matters will require further discussion between the central authority which it is proposed should be set up to administer the scheme (composed of not more than four or five members) and trade associations. In the case of the retailer-wholesaler, such as in the ironmongery trade, it is considered that the wholesale side should not be saddled with the levy. In the electrical trade the problem is admitted to be an involved one, because the Committee is advised that the two sides of the electrical contractor's business—retailing and contracting—are intimately interconnected. The distinction between goods and services brings further complexities. Where services of repair, maintenance or "after service" are supplementary to the main business of the sale of merchandise (*e.g.*, repair of wireless and electrical apparatus) it is considered that such activities should be classed as retail turnover, with the proviso that a trader may make application for the exclusion of some part of his operations from his return of turnover.

A minority report signed by the general secretary of the Co-operative Union opposes the scheme, and there are two addenda by members who have signed the report. The first calls for controlled retailing after the war. The second refers to difficulties of the small trader created by the inequitable distribution.

Electrical Contracting

Report of E.C.A. President for 1941-42

FOLLOWING upon the precedent which he set in 1939 Mr. Walter Riggs, president of the Electrical Contractors' Association and its allied organisations, combined in one document the annual report and presidential address which he presented at last Tuesday's annual meeting. At the same meeting it was announced that Mr. Riggs had consented to act as president for the fourth successive year.

Reviewing the principal events of the war since last year's meeting he spoke of the solid determination of the people of the United Kingdom and of the British Empire, confirmed and supported by the United Nations, that the struggle, however difficult and however prolonged, must and would be pursued until final victory had been achieved.

Merits of Collective Effort

The collective work of the well-organised associations of employers and employees in this country was doing much to assist the national effort. The days of individual and isolated effort had long since passed, and the control which the Government had been compelled to exercise over the whole of the trading community of the country would have been immeasurably inferior in its operation but for the unity of the trade associations and the advice they had been able to give as a consequence of their specialised knowledge and experience.

The Electrical Contractors' Association, the N.E.C.T.A., Ltd., and the National Federated Electrical Association had played their parts each in its own well-defined sphere to weld the electrical contracting industry into a solid and efficient unit to the end that the public might be better served and the war effort fully assisted.

Here the president expressed the Association's sincere sorrow at the loss of their late vice-president, Mr. Clifford James, of Bath, who, a comparatively young man, was killed whilst on duty as a special constable.

The Association was as virile and vigorous as ever, although certain branches had been compelled to lessen their activities to some extent. During recent weeks three regional conferences had been held and the numerical attendance had been greater than ever before. Regional conferences were first held only a year or so before the commencement of the war, and, because of war difficulties, were largely suspended in 1941. Further conferences had already been fixed and there seemed to be a strong desire that these informative meetings should be organised again throughout the country.

The weekly and often more frequent head office communications to the members had been fully maintained. The Council has pursued the policy of giving the members explicit and up to date information concerning all developments.

Constant negotiations had been in progress with various Government Departments on a wide variety of matters. Frequent consultations had taken place between the Association and representatives of the various Ministries with which members were concerned, and the Association's services had been placed at the disposal of the Government in a variety of matters. In technical matters the E.C.A. had undertaken its full responsibilities. It was participating very actively and with good effect at the present time in connection with the War Emergency Specifications which the Ministry of Works and Buildings was about to introduce.

Government Contract Conditions

Considerable effort has been made in connection with the terms and conditions of Government contracts. The Association regretted the system operated by various Departments in respect of the costing clause in contracts. It seemed unfortunate that one party to the contract, the Government Department, should have an unfettered right—in respect of a fixed price contract—to determine what should actually be paid in final settlement to the contractor concerned.

The work of N.E.C.T.A. had been confined as usual to trading problems. The Fair Trading Policy continued to be the criterion by which fair trade practice was regulated. There was a growing realisation by all concerned of the need for clarifying many outstanding questions and also for making sure that well-defined trading "laws" would govern the future of the industry. The relationship of the N.E.C.T.A. with the E.L.M.A., the C.M.A. and all other bodies with which it is associated continued to be most cordial.

An opportunity was afforded to the N.E.C.T.A. and to other retail trading organisations to meet a section of the Retail Trade Committee of the Board of Trade in respect of the wartime difficulties of traders.

Referring to the work of the National Federated Electrical Association, Mr. Riggs said that lengthy negotiations with the Electrical Trades Union, in response to the desire of the N.F.E.A. to secure a revision of the Wages (War Adjustment) Agreement, resulted in two appearances before the National Arbitration Tribunal.

During the year a dilution agreement had been reached, thus permitting—when national circumstances made it necessary—the introduction of "dilutees," both male and female, into the industry for the period of the war. Good progress had also been recorded in connection with the control of labour under the age of twenty-one years. Already national rates of wages had been fixed for certain categories of boy labour and arrangements had been made for the registration of boys who, although not indentured apprentices, were none-the-less being trained to take their proper place as the journeymen electricians of the future. He hoped that, as soon as may be after the end of hostilities, the personnel of the electrical contracting industry would consist solely of those who were properly qualified and those who were undergoing proper training.

The subject of holidays with pay had been resuscitated and it seemed that the electrical contracting industry would be able to keep pace with the building industry in carrying into effect a principle which the Association had supported for a long period of time.

Application of Essential Works Order

Negotiations had ensued with the Ministry of Labour and National Service over a large variety of problems not the least of which was the proposal that the electrical contracting industry should be subject to the provisions of an Essential Works Order. A draft Order issued by the Ministry had been examined and was the subject of a conference which took place between the Ministry, representatives of the Association, and other interests concerned as long ago as February 27th. So far no information had been received from the Ministry as to its willingness to adjust the proposed Order to meet the exigencies of the trade.

Negotiations between the National Association of Radio Retailers and the Wireless Retailers Association had resulted in the formation of a new independent Association. The N.A.R.R., which was inaugurated by the N.E.C.T.A. several years ago, was now being wound up voluntarily.

During the year the National Joint Industrial Council for the retail hardware, electrical, cycle and radio trades had produced an agreement covering wages and working conditions for persons employed in retail distribution. The N.F.E.A. was pleased to be a party to this newly constituted Council because of the eminent desirability of securing fair and equitable treatment for all engaged in the industry.

In industry the war effort had perforce brought masters and men, owners and operatives, employers and employed much nearer together—both sides recognising that only by close collaboration could the greatest good and best results emanate. Those young and middle-aged men now fighting our battles all over the world must have a big say in any reconstruction.

The Ministry of Works and Buildings did not intend that the reconstruction problem should be left to the whims and fancies of individual civil engineers, architects, manufacturers and building contractors whose interests often necessitated their pulling in opposite directions. He thought that the underlying idea was that there should be a central body to co-ordinate and direct their several energies along definite lines, or to consult with the various interested parties to formulate a scheme to which they could all subscribe.

Electrical contractors had of necessity been individualists. In the future, it would be somewhat difficult, he thought, for any newcomer to enter the industry, as owing to recent legislation, every contractor had to be licensed. It would appear, therefore, that the reign of the uneducated and ill-informed contractor working more or less from hand to mouth, and with no definite responsibilities, was over.

Code of Working Rules

There was no doubt that before very long we should see a standard code of working rules to which it would be incumbent upon the contractor and the operatives to adhere. Although this would obviously be to the contractor's advantage it was intended for the benefit and safety of the public.

In this reorganisation that must come about it seemed to him that there were three or four broad lines on which they could be of very definite assistance:—(1) As individual contractors they must give of their best, and as opportunity arises advise and serve on any committees that might be set up to formulate any general schemes. (2) They must give any and every information that was asked for by the Association, for the Association to formulate and use in its negotiations to secure the greatest measure of efficient organisation. (3) They should attend all branch meetings and thus keep in full touch with the trend of electrical installation affairs. (4) In negotiations the Government would only recognise established and representative professional and trade associations. Such being the case they must use their best endeavours to strengthen the E.C.A.

Mr. Riggs expressed his thanks to the vice-presidents and past-presidents who had supported him during the past twelve months, particularly to the chairman of the Executive Committee, Mr. W. H. Walton. He also thanked the Sectional Board and branch officials, and said that the membership had been brilliantly served by the Director, Mr. L. C. Penwill and the editorial and headquarters staff.

When Mr. Riggs had concluded his address he was warmly thanked by Mr. H. J. Galliers. Mr. W. H. Walton then presented the accounts, which disclosed a very satisfactory financial position. In seconding their adoption, Mr. W. C. Hellaby expressed the members' appreciation of the work put in by Mr. Walton.

Mr. T. E. Alger, announcing the re-election of Mr. Riggs as president, mentioned Mr. Riggs' outstanding successes in many diverse spheres. Mr. R. G. Payne said he wished that the large proportion of members who took no active part in the Association affairs would realise what they owed to their more active colleagues.

COMMERCE and INDUSTRY

Anti-Waste Order. Forces' Demand for Men.

Fuel Economy

IN a postcript to the 9 o'clock news last Sunday the Minister of Fuel and Power (Major G. Lloyd George) broadcast an appeal to the public to help close the gap between coal production and consumption by exercising the utmost economy in the use of coal, gas and electricity. Although he addressed himself in the first place to domestic consumers he said that he realised that even greater savings could be made in industry. He asked all boiler house men to get the last ounce out of their fuel, and managements to secure the greatest possible efficiency. To ensure efficiency and economy he was issuing an Order which would make the wasting of fuel an offence. He believed that a voluntary scheme would succeed but he had to be prepared to impose rationing of fuel if it became necessary.

The Order referred to by Major Lloyd George was issued on Monday. This, the Waste of Fuel Order, 1942 (Stationery Office), covers coal, gas, electricity and paraffin, and under it the Minister may issue directions with a view to preventing waste and effecting all reasonable economy in fuel consumption. There will be penalties for non-compliance with the Order. Waste is defined by the Ministry as the use of fuel when it is not reasonably necessary or in unnecessary quantities for a particular purpose. Uneconomical use includes failure to take reasonable steps to save fuel such as, for instance, employing proper fittings and appliances and maintaining them in serviceable condition.

Industrial Comb-out Warning

The Minister of Labour and National Service stated a few days ago that the demands of the Forces for men would shortly lead to a drastic comb-out of the munitions industry. In practically all trades the limit for the calling up of the younger men had been reached and the munition works would now have to be considered. He asked employers to take the necessary steps now to prepare for this demand. Skilled men over 35 years of age with long experience should be upgraded and " dilutees," including women, put in their places.

He did not intend to make a sudden swoop, but the delays attending the consideration of individual cases would have to be surmounted. They would be careful in taking men not to impede production but he reminded employers of their responsibility to do their utmost to prepare for the loss of men.

Increasing Production

Suggestions for improving the rate of production without further increase of plant are made in a memorandum submitted to the Minister of Production by the Institution of Production Engineers. It is considered that the object can be achieved by increased machine activity; simplification of design; rationalisation; and improved manufacturing methods. It is maintained that many small firms are inefficient and that many more are growing up each day—a tendency which should be prevented. The earlier policy of spreading contracts should be abandoned in favour of concentrated production.

Call-up in Building Trades

The age of reservation for men in building and civil engineering occupations has been raised to 41 in accordance with proposals discussed some time ago with the building and civil engineering contracting industries. On account of the urgent demands for constructional work, however, it is not proposed in general to call up immediately for the forces men whose age of reservation is thus raised if they are engaged in approved employment on such work or are transferred to such employment. Under arrangements already made a limited number of men below the existing reservation age of 30 will be called up within the next few weeks, but for the others and for those over 30 deferment of calling up will be given if they are employed on or are transferred to vital construction work of immediate urgency. The occupations for which the age of reservation has been raised are those which are covered by the special scheme for building and civil engineering as indicated in the Schedule of Reserved Occupations (Revision, December, 1941).

F.B.I. and Industrial Organisation

The Federation of British Industries, in its recent Report on Reconstruction, stated that industry was prepared to reconsider all the implications of industrial organisation, but that the Government on its side must define its attitude towards trade associations and pursue a consistent policy towards them.

In pursuance of this recommendation, the Grand Council of the F.B.I. authorised the president to appoint a committee to consider the questions affecting the trade association movement of the country and to submit a report to the Federation based upon its study of the problem and the evidence which it receives from its trade association members. Sir Charles Bruce-Gardner has accepted the chairmanship of this committee, which will begin its work at an early date.

Manchester Waste-Paper Exhibition

The exhibition " Waste Paper goes to War " which was opened in Manchester on June 25th in the Great Hall at Lewis's, Ltd., is continuing until July 11th and remains open each week-day from 10 a.m. to 5.30 p.m. (Wednesdays from 10 a.m. to 1 p.m.). The exhibition, organised by the Waste Paper Recovery Association on behalf of the Waste Paper Merchants' Association, tells the whole story of waste paper from the time it is put out for salvage until it becomes a munition of war.

The Association urges firms to reduce the size of their letterheads. The majority are still using the quarto size instead of octavo. As

trading is so restricted and the opening of new accounts most improbable, all the business man needs on his notepaper is his name, address, telephone number and, if not indicated in the title, the nature of the business. This need occupy no more than ¾ in. of space at the top of the letter.

Employment of Electricians in Ulster

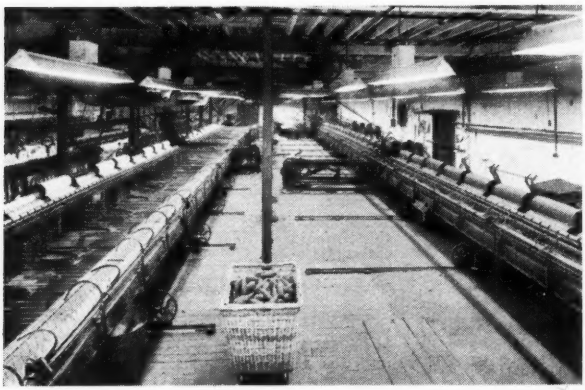
The heavy demand for men with experience as electricians has led the Ministry of Labour for Northern Ireland to make an Order under the Defence Regulations by which registration becomes compulsory for all persons who within the 15 years immediately preceding June 29th, 1942, have been engaged for an aggregate period of not less than twelve months as electricians or apprentice electricians.

The Northern Ireland Ministry of Labour has also made an Order regulating the engagement of workers for general engineering and electrical installation undertakings. Under the Order, which came into force on July 1st, no employer carrying on such an undertaking may engage a worker or seek to engage one otherwise than through an Employment Exchange.

While there is no conscription in Northern Ireland, military or industrial, the Ulster Government has power to direct labour if the need arises. Until now it has not exercised this authority.

Spinning Shed Lighting

An extensive installation of 80-W fluorescent discharge tubes in a mule spinning shed has just been completed at the mill of J. B. Battye & Co., Ltd., Yeadon. In mule spinning the working plane is some 3 ft. 6 in. from floor level and the whole of the frame area must be so lighted that the spinner can have all the threads under observation. The seeing task, whilst not particularly severe, is fatiguing if lighting conditions impede ready observation.



Mule spinning shed illuminated by 80-W fluorescent lamps

Before the Edison Swan Electric Co. was asked to re-plan the lighting, the shed was lighted by incandescent and mercury vapour lamps mounted at varying heights and spacings. The illumination was of a low order, uneven and produced undesirable shadows. The accompanying illustration illustrates part of the shed which is now lighted by "Royal Ediswan" fluorescent tubes in industrial trough reflectors mounted 8 ft. 6 in. above floor level and spaced at 9-ft. centres. The intensity of illumination of 11-ft. candles enables the operatives to see individual threads from practically any part of the mule "gate" without eye strain or fatigue. Ediswan "Industra" adjustable trough reflectors have been installed throughout by the contractors, J. W. Hinchcliffe (Leeds).

World Mineral Resources

The British Association for the Advancement of Science has arranged a conference of scientists to discuss the world's mineral resources in relation to the Atlantic Charter. The conference will take place at the London School of Hygiene and Tropical Medicine and will be opened by Sir Richard Gregory, F.R.S., president of the Association.

The geographical distribution of important industrial raw materials and their control will be dealt with in an endeavour to promote recognition of the interdependence of nations and the need for collaboration.

Deal in Torch Batteries

In the Court of Appeal on June 26th the Master of the Rolls and Lord Justices MacKinnon and Goddard concluded the hearing of an appeal by C.R.T.C., Ltd., and Mr. Hillman from a judgment of Mr. Justice Tucker in favour of the Radio Merchandise Co., Ltd., in an action by them against the appellants to recover damages for misrepresentation in the sale of torch batteries and against the company for the return of the money they had paid, £308 15s. The case for the plaintiffs was that they purchased on a guarantee that the batteries were clean goods and new and that they paid in cash. The plaintiffs alleged that the batteries were salvage or damaged goods. They were imported from Hong Kong.

Defendants denied that there was any warranty and pleaded that there had been inspection by the plaintiffs. They also denied that there had been any misrepresentation.

Mr. Cartwright Sharp, K.C., for appellants, argued that the goods came within the ambit of clean stock, and that in any case the sum awarded the plaintiffs was far too high having regard to the fact that only about four cases out of thirteen were unsaleable.

Mr. Gallop, for the respondents, supported the findings of Mr. Justice Tucker.

At the end of the legal arguments, Mr. Cartwright Sharp said he had agreed with Mr. Gallop

that, provided the Court supported Mr. Justice Tucker's judgment, the damages should be reduced to £70.

The Master of the Rolls, in giving judgment, said Mr. Justice Tucker had found that there was no warranty, but that two misrepresentations had been made to induce the contract and that plaintiffs had suffered damage thereby. There was nothing to upset the findings of the learned judge as to the facts, but there was no ground for saying that the whole of the goods were worthless. In these circumstances the judgment would be varied by substituting £70 for the amount awarded by the judge (£308). The appeal therefore failed and the appellants must pay the costs.

Maximum Prices for Second-hand Plant

Maximum prices for second-hand contractors' plant and certain agricultural implements are imposed by an Order, S.R. & O. 1942 No. 1163, made by the Minister of Works and Buildings in agreement with the Minister of Agriculture and Fisheries and the Secretary of State for Scotland under Regulation 55 of the Defence (General) Regulations, 1939. The Order, which does not apply to Northern Ireland, came into force on June 29th.

M.E.M. Savings Scheme

The Midland Electric Manufacturing Co., Ltd., through its National Savings Committee, has arranged a new saving facility for the convenience of its workpeople. For some time employees have been contributing to National Savings by deductions from their earnings, and some thousands of certificates have been sold. By arrangement with the Birmingham Municipal Bank and the National Savings Committee, the M.E.M. has decided to open a special branch of the Birmingham Municipal Bank in the works, where it will be possible for employees to invest their additional savings. The Bank will be open on five occasions during the week, at different times to enable not only the full-time employees, but also the morning, afternoon and evening part-time workers to make use of the facility. M.E.M. employees operating the scheme have been appointed official agents of the Bank. It will also be possible to purchase National Savings stamps and certificates at any time during Bank hours. The scheme is the second arranged in Birmingham and the first in the electrical industry.

Public Service Transport Association

The annual general meeting of this Association is to be held at the Grosvenor Hotel, Victoria Station, S.W.1, on July 15th. The accounts which are to be presented show a surplus of £20, compared with £71 in the preceding year. Nominations of candidates for the Council by members must reach the secretary by July 8th.

Indian Import Restrictions

The Government of India has issued a notification superseding the Open General Licence No. 11 previously applying to imports of most goods from the United Kingdom. The effect of this notification is that special import licences will be required for the importation from this country into India of goods previously covered by the Open General Licence when such goods are despatched from the United Kingdom on through consignment on or after July 1st. These licences will be valid in the first instance to cover shipments during the period of six months ending December 31st, 1942. The notification has a similar effect as regards imports from Australia, Canada and Newfoundland.

M.E.C. Pension Trust

The M.E.C. Pension Trust, Ltd., has been registered as a private company with a capital of £100. Its objects are to act as trustees (without undertaking the management or administration) of the endowment and pension fund for staff employees of the Midland Electric Corporation for Power Distribution, Ltd. Messrs. D. J. Sinclair (director, M.E.C.), C. Heathcock (managing director, M.E.C.), and G. F. Peirson, are the directors.

Newman Motors

We regret that a line was inadvertently omitted from the advertisement of Newman Motors' Pulley Calculator in our last issue (page 26). It was :—" Head sales office: 32, Victoria Street, Westminster, S.W.1. Tel.: Abbey 2023."

Wages in the Cable-Making Industry

The Joint Industrial Council for the Electrical Cable-Making Industry announces that the cost-of-living figure on June 1st (99 per cent. above the 1914 level) will not involve any alteration in wages on the third pay day in July.

Trade Announcements

The National Fire Protection Co., Ltd., has appointed the Sloan Electrical Co., Ltd., 9, John Street, Bristol, and at 32, Gandy Street, Exeter, and W. R. & F. G. Kirkby, Somerset House, 2, Brazil Street, Manchester, 1, as its agents.

Kelvin Bottomley & Baird, Ltd., and Henry Hughes & Son, Ltd., associated as Marine Instruments, Ltd., have opened a depot at 91, Hope Street, Glasgow, opposite the Central Station, for servicing their navigational specialities.

The Birmingham address of Dynamo & Motor Repairs, Ltd., is now Phœnix Works, Belgrave Terrace, Soho Road, Birmingham (telephone: Northern 0898).

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following :—

" B " Minor Annan pump.

Installation Maintenance

Wartime Problems Discussed at I.E.E.

A THIRD informal discussion on wartime electrical installation problems is to be opened by Mr. S. W. Field on July 9th at an additional meeting of the I.E.E. Installations Section when the maintenance of equipment in commercial and factory buildings and institutions will be dealt with.

Many of these have been changed over to wartime uses involving considerable alterations, adaptations and additions, much of which has been carried out haphazardly or has been inefficiently maintained for many years. Terminal points cause most trouble, Mr. Field says. A carefully made cable is stripped of its insulation by knives or pliers, thus exposing the fine ductile wires to be twisted or cut and then clamped or wedged into accessories.

Maintenance problems are chiefly connected with screwed conduit (electrical discontinuity), lead-covered cables (unsatisfactory connections to accessories), tough-rubber-sheathed cables (attacks by vermin), under-floor duct systems (nuisance of floor traps, disturbance to cables when drawing in new ones and unsatisfactory methods of earthing), capping and casing and cleat wiring. The last-named gives little trouble, faults being visible and accessible; fire risk is less than generally supposed, while its very lack of mechanical protection may secure freedom from damage.

Troubles with Accessories

Most accessories (of which there are far too many types) contribute to the outstanding problem of terminal points. Compactness of design frequently entails waste of time in rectifying small faults. Insulation is often damaged by the cord grips of lampholders. Tumbler switches are not generally robust enough for the hard treatment received. Backlash on the chain of ceiling switches is a common trouble, but in later models this difficulty has been overcome. Semi-recessed ceiling roses are thoroughly bad, the hard wires having to be disturbed for every alteration or renewal of flexibles. Sharp ridges are a frequent source of trouble with conduit fittings and the fetish of compactness often leaves no room for bushes. Misuse of flexible cables is a recurring cause of faults.

Cartridge fuses should be standardised and substituted for the rewirable types which are too easily tampered with. The development and extended use of small circuit breakers is most desirable. Regarding fluorescent lighting, Mr. Field expresses the hope that the cost of the tubes will decrease, that the peaks of inherent characteristics will be flattened out, and that the design of fittings and accessories will be standardised.

Difficulties in maintenance of bells and alarms are mainly due to the common view that anything is good enough for this service. Motors give little trouble, but standardisation is needed to facilitate interchange and replacement, particularly of shaftheights and holding-down bolt centres.

The number of fires due to defective wiring is low (a good screwed conduit installation being practically immune from fire hazard) and risks of shock and breakdown are probably more important. A period spent on maintenance, with an occasional refresher course, would be useful for skilled men.

If materials become scarcer, their conservation may become the most important factor, leading to such expedients as the use of bare iron conductors, air insulation and protective covering of some plaster-like material. On the other hand improvisation to meet wartime conditions may contribute to the solution of post-war problems.

American Notes

IT is reported by the *Electrical World* that as from May 18th the maximum prices of practically all the machinery and equipment required by American electrical utilities were fixed at the October 1st, 1941, level. It is noted that this is a special arrangement as the prices of most commodities have been " pegged " at the March level. The maximum prices of rebuilt and guaranteed equipment are fixed at 85 per cent. of the maximum prices of comparable new equipment and those of other second-hand items at 55 per cent.

All sellers and lessors subject to the schedule were required by the Office of Price Administration to file a complete statement of their October 1st prices by July 1st.

According to the same journal, members of the National Fire Protection Association of the United States have been asked to approve an emergency amendment of the 1940 National Electrical Code providing for the substitution of varnished cambric for rubber insulation for the conductors of armoured cable.

It has been announced by the Westinghouse Lamp Division that all " civilian " lamp bulbs in the 10-W to 300-W sizes and most industrial lamps are to be made with iron instead of brass caps this year. As a protection against corrosion the caps will be given a thin coating of brass. This, it is said, will save about 90 tons of brass a year. Nearly all nickel consumption for lamp manufacturing has been eliminated by the company which is using nickel-plated iron wire. The use of tin has been cut by 50 per cent. and a further reduction is being made.

ELECTRICITY SUPPLY

Dundee Price Reduction. Salford Coal Contracts

Birkenhead.—MINIMUM CHARGE REDUCTION. —It is proposed that the existing minimum charge of £1 shall be reduced to 14s. per annum for the period of the war.

Chester.—LOAN FOR SUBSTATIONS.—The Electricity Committee is seeking sanction to borrow £19,750 for substations.

Dundee. — LOWER CHARGES. —Electricity charges in Dundee are to be reduced as follows : Lighting, 2¾d. to 2¾d. per kWh ; small power users, 1¼d. to 1½d. ; shops, etc., 0.75d. to 0.7d. ; prepayment meters, 2 ⅜d. to 2⅝d. At a recent meeting the convener of the Electricity Committee and the management were congratulated on the splendid results attained. Last year substantial reductions were made in respect of industrial power and tramways and also in the charges to prepayment meter consumers. The convener, in reply, said they had agreed, rather against their will, to the reduction on the distinct understanding that it could not be held against the Department if it resulted in an adverse balance.

Glasgow.—GAS COMPRESSOR INSTALLATION.—With reference to the decision to accept the offer of G. Waller & Sons, Ltd., Stroud, amounting to £5,780 for the installation of gas compressors at a works, the general manager reported to Glasgow Corporation Gas Committee that the Board of Trade had demanded that the compressors should be electrically driven instead of steam driven, and the Committee agreed to accept an amended offer from the company amounting to £8,912, and authorised the manager to arrange with the Electricity Department for the erection of low-voltage switchgear and cabling from the transformers to the gas compressors and the oxide handling plant at the works, together with the necessary lighting points throughout the plant, at an approximate cost of £1,550.

ELECTRICAL EQUIPMENT.—The Education Committee has authorised the director to purchase a testing machine at a cost of £422 and electrode boilers and fittings at a cost of £1,372 for day classes for marine engineers. The Sub-Committee on Properties agreed to install four convector heaters in the Burgh Court and two radiators in the magistrates' room, together with a new main cable, at an estimated cost of £55.

MAINS.—Special extensions of distributing mains at a cost of £3,080 and expenditure of £5,000 on meters, etc., for change-over purposes, have been approved by the Electricity Committee. At a later meeting the Committee approved of ordinary and special extensions at a cost of £2,035 and £726.

CAPITAL EXPENDITURE.—The general manager of the Electricity Department having reported on the necessity of incurring capital expenditure on specified works to the extent of £10,000, the sub-committee on Finance and Works has instructed the town clerk to make application to the Electricity Commissioners for the necessary consent.

London.—POPLAR.—The Electricity Committee is to change over DC mains to AC in one area at a cost of £735 and effect economies by moving a 1,000-kW automatic mercury arc rectifier from one substation to another, at cost of £500.

Oban.—RESERVE FUND QUESTION.—When the setting up of a reserve fund for the electricity undertaking was considered recently it was explained that this could not be done until the Town Clerk had received from the Grampian Electricity Supply Co. the amount due to be paid in respect of the transfer to the company of the generating side of the undertaking. The Council agreed that a sub-committee should go into the whole question of the delay in the settlement of the transaction and report to a special meeting of the Lighting Committee.

Salford.—COAL CONTRACT POSITION.—It was stated at a recent meeting of the Light, Heat & Power Committee that while large supplies of "spot lots" of coal were readily available at ever-increasing prices, growing difficulty was being experienced in obtaining deliveries of contracted supplies for the gas and electricity works. The *Manchester Guardian* reports that concern was expressed at the position, and after the meeting Councillor Townsend, chairman of the Committee, said that this difficulty was being experienced by almost every large authority, and probably to a still greater extent in the south. Beyond doubt something was seriously wrong, and it would be necessary for supply undertakings to take united action to force an investigation by the Ministry of Fuel. The coal was there, but it was not being used to fulfil legal contracts.

Overseas

Canada.—LARGE ONTARIO PROJECT.—The Premier of Ontario (Mr. Mitchell Hepburn) announced recently that it was proposed to commence work immediately upon a new development on the Ottawa River involving plant rated at between 200,000 and 400,000 HP and costing over $30,000,000. The site of the plant is on the Ontario-Quebec boundary, and Dr. T. H. Hogg, chairman of the Hydro-electric Power Commission of Ontario, is negotiating with the Quebec Government in the matter.

Eire.—CONSUMERS DISCONNECTED. — The Electricity Supply Board has just revealed that for using electricity in excess of the stipulated amount a number of consumers in the Sligo district, including three private residents, have had their electricity supply disconnected for seven days. The public are being cautioned by the Press against any excessive optimism with regard to the results of the recent electricity restrictions. There is, indeed, every reason to believe that further and more rigorous restriction of consumption will soon be imposed. The necessity for more economies in the use of electricity is imperative owing to the progressive aggravation of the coal situation. The amount of coal at present imported is very small and the outlook is described as "extremely serious."

POST-WAR RURAL POLICY.—In the Senate, during the discussion on the second stage of the

Electricity Supply Board (Superannuation) Bill, Senator O'Callaghan alluded to the fact that 500,000 rural homes were still without electricity. The rural electrification policy of the Government was the subject of a declaration by the Minister of Commerce, Mr. Lemass, who told the House that he had asked the E.S.B. to prepare a complete scheme of the most detailed character. The Board had been requested to have this scheme ready for putting into operation when the present war conditions no longer existed, and when it would be possible to obtain the requisite plant and materials. Questioned with regard to the cost of the scheme, the Minister said that he was unable to give any precise information on this point, for obvious reasons. He hoped that when the war was over the scheme would be in perfect, practicable shape so that they could go ahead with it " as circumstances justified."

TRANSPORT

Belfast.—TRANSPORT FINANCES.—The operations of the Corporation's transport undertaking during the financial year ended March 31st last resulted in a working profit of £72,358. The tramway section contributed a working profit of £149,049, less income tax (£55,457), loan, etc., leaving a net profit of £40,549. The trolley-bus section—a growing one—showed a working profit of £55,573 and a surplus of £25,524. The omnibus section's surplus was £6,554 and the working profit £13,451. The total income tax having been charged to net revenue account, a reserve of £45,500 is to be carried forward as provision for the current year's liability. A sum of £15,000 has been earmarked in respect of war damage insurance and after deducting statutory reserve fund, £40,000, depreciation and renewals fund, £6,899, and writing down stores, etc., a sum of £10,000 is available in aid of the city rates. The Transport Committee expressed themselves well satisfied with the manner in which the acting manager, Mr. Samuel Carlisle, and staff carried out their duties, sometimes in exacting conditions. Colonel R. McCreary, D.S.O., M.C., manager, is on service with the Royal Engineers.

Canada.—RESTORATION OF TRAMWAYS.—Proposals to discontinue services in some towns seem to have been vetoed by the Deputy Transit Controller for the Federal Government, who has ruled that Canadian cities will not be permitted to discontinue such services for the duration of the war. *The Engineer* reports that several municipalities have recently been required to restore to service tramway lines that had already been abandoned.

OIL-ELECTRIC LOCOMOTIVES.—Of the twenty new oil-electric shunting locomotives which are now in service on the Grand Trunk Western and the Central Vermont lines of the Canadian National Railways, fifteen were supplied by the General Motors Corporation, Illinois, and five by the American Locomotive Co., Schenectady. Both makes are rated at 1,000 HP and are similar, though the engines differ in operating on the two-stroke and four-stroke principles as well as in cylinder arrangements and engine speeds. These twenty new engines are said to have released twenty-nine steam locomotives for other work.

Black-out Lighting in Factories

LIGHTING forms only a small proportion of the industrial load and views commonly expressed regarding the additional amount of fuel consumed on account of the blacking out of factories in the daytime are often wide of the mark.

In a pamphlet entitled " Fuel Economy in Daylight " issued by the Committee Advocating Daylight in Factories, the cost of providing 10 ft.-candles by electricity is equated with that of daylight admitted through shuttered glazing totalling 15 per cent. of the floor area, although experience would suggest an average of 6 ft.-candles by natural light as more likely having regard to the difficulties of keeping windows clean in present circumstances.

The Committee subtracts only 220 hours for holidays and dark days from the 3,650 hours of daylight, but the E.L.M.A. Lighting Service Bureau considers that 1,825 hours more fairly represents the time during which daylight is adequate for some part of a factory. Even in brighter weather daylight will not provide the requisite additional illumination needed. For many processes, also, a steady value of artificial light is to be preferred to widely varying natural light. At least one third of the artificial lighting would probably have to be kept in use all day with 15 per cent. glazing.

In the pamphlet mentioned, the cost of 10 ft.-candles of artificial lighting during daylight hours, with a floor area of 100,000 sq. ft., is calculated at £3,562 per annum, assuming a lamp life of only 700 hours and a price per kWh of ¾d. ; on the same basis the cost of 6 ft.-candles would be £2,187. Estimates for 15 per cent. shutters vary between £2,625 and £4,125. The average factory would seem to require all its lighting for half the daylight period and at least one third for the remaining half, so that at best only one third of the total electricity costs and one-third of the fuel are saved. Thus an expenditure on shutters of £2,625 as a minimum results in a saving in another direction of £712, the coal saved costing more than £20 per ton.

Consulting Engineers

THE annual report of the Committee of the Association of Consulting Engineers, the new chairman of which is Mr. Harold J. F. Gourley (Messrs. Binnie, Deacon & Gourley, of Westminster) records an increase of membership to 170. All meetings are now held at the new offices at 28, Victoria Street, Westminster, London, S.W.1. In the new edition of " Professional Rules, Practice and Scale of Fees," which became available in March, 1942, the portion which formerly dealt with relations between client and consulting engineer has been entirely rewritten and, for the first time, a definite scale of fees has been introduced. During the year the chairman made 23 nominations in response to inquiries for the services of consulting engineers, while contact was maintained with Government Departments. The financial position of the Association improved somewhat during the year.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The London Electric Wire Co. & Smiths, Ltd., held its annual meeting on June 26th when Mr. W. J. Terry (chairman and managing director) said that the small reduction in the profit balance could be considered satisfactory in existing circumstances. During the year the supplies of some raw materials had been restricted and substitutes had been found to meet the altered conditions.

Dealing with labour conditions, Mr. Terry said that the councils at the company's factories, upon which the employees and the management were equally represented, had proved of great benefit in dealing with local questions. He considered that the bargaining for higher wages by trade unions was unfortunate ; wages should be dealt with on a national basis for each industry.

With regard to excess profits tax, he said that the liquid resources of many companies would be seriously strained which would lead to borrowing to cover current commitments. In addition the revenue wear and tear allowances were insufficient to meet the present heavy depreciation of plant and machinery.

The future must remain obscure, but it was of some concern to manufacturers to be placed in a position to produce goods at prices which would enable them to regain lost markets after the war.

Callender's Cable & Construction Co., Ltd., in its report for 1941, shows a profit of £406,873, as compared with £428,774 for the preceding year, and after deducting depreciation, debenture stock interest and dividends on the preference stocks, there is a balance of £257,373 (against £279,274), to which is added £377,518 brought in, making £634,891. As already announced the final ordinary dividend is 10 per cent., maintaining the distribution for the year at 15 per cent., less tax. Reserve for equalisation of dividends, or for war contingencies, receives £200,000 and the balance carried forward is £266,304. The report states that while the turnover has been well maintained, there is a reduction in the amount of the gross profits for 1941 as compared with 1940 due to the heavy additional sums that have had to be provided for taxation.

The Revo Electric Co., Ltd., is again paying a final ordinary dividend of 10 per cent., but the bonus is cut from 5 per cent. to 2½ per cent., making 17½ per cent. for the year (against 20 per cent.). The net profit for the year to March 31st is £54,317, as compared with £53,501 for 1940–41.

Cable & Wireless, Ltd.—Presiding at the annual meeting held on June 24th Sir Edward Wilshaw (chairman and managing director), in referring to the various services of the company, mentioned the wireless picture service which, he said, both at home and overseas had been and was being greatly improved and extended to meet a constantly growing demand. With regard to Press traffic, it would be remembered that before the war they had reduced the rate for this service within the Empire by half, and last year they made further drastic reductions and introduced an Empire rate of 1d. a word for the duration of the war. Sir Edward concluded by paying tribute to the staff many of whom, in the Far East, were either interned or missing.

Marconi's Wireless Telegraph Co., Ltd.—At the annual meeting last week the chairman and managing director (Admiral H. W. Grant, C.B.) referred to the purchase since the last annual meeting of the shareholding of E. K. Cole, Ltd., in Marconi Instruments, Ltd. (formerly Marconi-Ekco Instruments, Ltd.). He said that this company was carrying on an important part of their business.

Associated British Engineering, Ltd., reports a net revenue for the year ended March 31st of £20,118, as compared with £11,992 for 1940–41, and after deducting expenses, fees and income tax, there is a balance of £16,074 (against £14,752). The ordinary dividend for the year is maintained at 5 per cent., and the outstanding balance of funding certificates is being redeemed, requiring £6,732. A balance of £5,529 is left to be carried forward (against £4,667 brought in). During the year the Brush Electrical Engineering Co., Ltd., exercised its option to commute the annual amount payable in respect of the goodwill, etc. of the company's engine business by payment of a capital sum which was taken by the company in preference and ordinary shares of the Brush Company. The amount so received has been credited to capital reserve account, which, after making provision for depreciation and loss on realisation of certain investments, now stands at £161,093.

Whitehall Electric Investments, Ltd., reports that the gross income of the company and of its group for the year ended March 31st was £125,358, as compared with £231,992 for the previous year, and the net income was £116,054 (against £208,174). The preference dividend is 5 per cent. (leaving 2½ per cent. in arrear), absorbing £125,000, of which £8,946 has been charged against the carry-forward. The amount brought in was £430,676, leaving an undistributed balance of £421,730.

The Harland Engineering Co., Ltd., reports a net profit for 1941 of £16,250, as compared with £11,754 for 1940. The ordinary dividend for the year is 4 per cent., leaving £14,187 to be carried forward (against £14,654 brought in).

The Electric Furnace Co., Ltd., is paying a final dividend of 4½ per cent. on the ordinary and 7 per cent. participating preferred ordinary shares, again making 8 per cent. for the year.

The Kalgoorlie Electric Power & Light Corporation, Ltd., announces a final dividend of 2 per cent., making 5 per cent., against 7½ per cent. for the preceding year.

The Morgan Crucible Co., Ltd., reports a trading profit for the year to March 31st of £536,812, as compared with £685,267 for 1940–41, plus £62,942 specific reserve no longer required and £37,644 interest on investments,

making £637,398. After deducting directors' fees, bank loan interest, etc., and providing £400,025 for tax, it is proposed again to pay an ordinary dividend of 10 per cent. for the year, to place £62,942 to reserve and to carry forward £266 (against £2,275 brought in).

The Victoria Falls & Transvaal Power Co., Ltd., is paying a final ordinary dividend of 11 per cent., again making 15 per cent., less tax, for the year.

International Combustion, Ltd., has declared an interim ordinary dividend of 5 per cent. (unchanged).

The Quebec Power Co. has announced a quarterly dividend of $0.25 on the common shares (same).

New Companies

Quantam Electronic Developments, Ltd.—Private company. Registered June 16th. Capital, £10,000. Objects : To carry on the business of manufacturers and repairers of, and dealers in, electrical accumulators, batteries, acids, containers, dynamos, motors, transformers, wireless and television apparatus, etc. Subscribers : R. J. Hicks, 40, Pavilion Way, Eastcote, Middlesex and R. N. J. Darling, 62, Daybrook Road, Merton Park, Surrey. Registered office : 68, Pall Mall, S.W.1.

A. G. Arnold & Son, Newport, Ltd.—Private company. Registered June 19th. Capital, £5,000. Objects : To acquire the business of A. G. Arnold and Son carried on by A. W. Arnold at 1, Godfrey Road, and 13, Skinner Street, Newport, and to carry on the business of electricians, electrical mechanical and wireless engineers and contractors. Directors : A. W. Arnold, 6, Lodge Road, Caerleon, Mon., G. Hayman, Glengarry, Ridgway Grove, Newport, Mon. Registered office : 1, Godfrey Road, Newport, Mon.

F. H. Bastin & Son, Ltd.—Private company. Registered June 18th. Capital, £1,000. Objects : To carry on the business of electrical contractors, electricians, wireless operators, etc. Directors: Wm. H. Bramley, 33, Ronan Road, Cheltenham, A. H. Ryder, 108, Prestbury Road, Cheltenham and S. C. Holman, 2, Denmark Villas, Cheltenham. Registered office : 86, Winchcombe Street, Cheltenham.

Electric Comfort, Ltd.—Private company. Registered June 19th. Capital, £100. Objects : To carry on the business of dealers in, manufacturers of, and agents for, electrical, wireless, technical and mechanical installations, plants, accessories, etc. E. F. Care, 39, Upcroft Avenue, Edgware, Middlesex is the first director. Secretary : Hans Fraustaedter. Registered office : 56, Aberdare Gardens, N.W.6.

Companies' Returns

Statements of Capital

Albert Electric Co., Ltd.—Capital, £200 in £1 shares. Return dated October 15th, 1940 (filed February 28th, 1942). 50 shares taken up. £50 paid. Mortgages and charges : Nil.

Direct Spanish Telegraph Co., Ltd.—Capital, £95,000 in 13,000 ordinary and 6,000 preference shares of £5 each. Return dated April 7th. 12,931 ordinary and 6,000 preference shares taken up. £94,655 paid. Mortgages and charges : Nil.

Robson & Coleman, Ltd.—Capital, £3,500 in £1 shares. Return dated April 7th. 3,191 shares taken up. £1,835 paid. £1,356 considered as paid. Mortgages and charges : Nil.

Yorkshire Switchgear & Engineering Co., Ltd.—Capital, £10,000 in 10,000 shares of £1 each. Return dated April 14th. 9,918 shares taken up. £2,882 paid. £7,036 considered as paid. Mortgages and charges : £4,000.

Bartrum Roylance & Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 31st, 1941 (filed April 16th, 1942). 2,500 shares taken up. £2,500 paid. Mortgages and charges : Nil.

Mortgages and Charges

Electrical Utilities, Ltd.—Assignment on June 8th, 1942, of proceeds of certain contracts, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

Receiver Released

Hartley Engineering Co. Ltd.—H. H. C. Mitchener, of 1, Fernlea Gardens, Bassett, Southampton, ceased to act as receiver and manager for first debenture holders on May 15th, 1942, and second debenture holders on June 13th, 1942.

Bankruptcies

S. W. Godfrey, 141, Mansfield Road, and 289, Alfred Street Central, Nottingham, electrical and radio engineer.—This application for discharge was heard recently at the County Court House, St. Peter's Gate, Nottingham. The receiving order was made in September, 1935. The assets were insufficient to meet the claims of the preferential creditors in full. The Judge adjourned the application to give the debtor an opportunity of applying again when he had considered his position more fully in regard to the creditors' losses.

H. A. Smith, electrical engineer and contractor and neon sign engineer, 76, Canterbury Street, Gillingham.—Application for discharge to be heard on August 19th at the Court House, Eastgate, Rochester.

L. C. Rowse, radio and electrical engineer, 20, Western Place, Penryn, Cornwall, formerly carrying on business at 60, Lower Market Street, Penryn.—Supplemental dividend of 2s. 7¼d. in the £, payable June 30th at 12, Princes Street, Truro.

Liquidations

Northbourne Electrical Co., Ltd.—Meetings, pursuant to section 245 of the Companies Act, 1929, on July 27th at 4, Cinema Buildings, Bournemouth West, to receive an account of the winding-up by the liquidator, Mr. C. J. B. Andrews.

National Association of Radio Retailers, Ltd.—Winding up voluntarily. Liquidator, Mr. P. C. Cavanagh, Africa House, Kingsway, London, W.C.2. Particulars of the scheme for the amalgamation of this Association with the Wireless Retailers' Association were given in our issue of June 19th.

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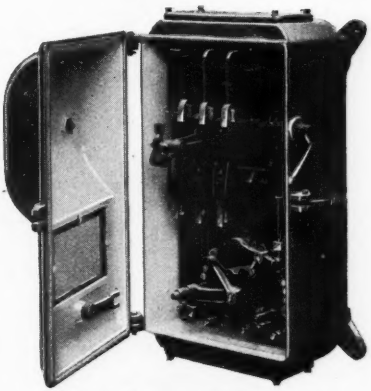

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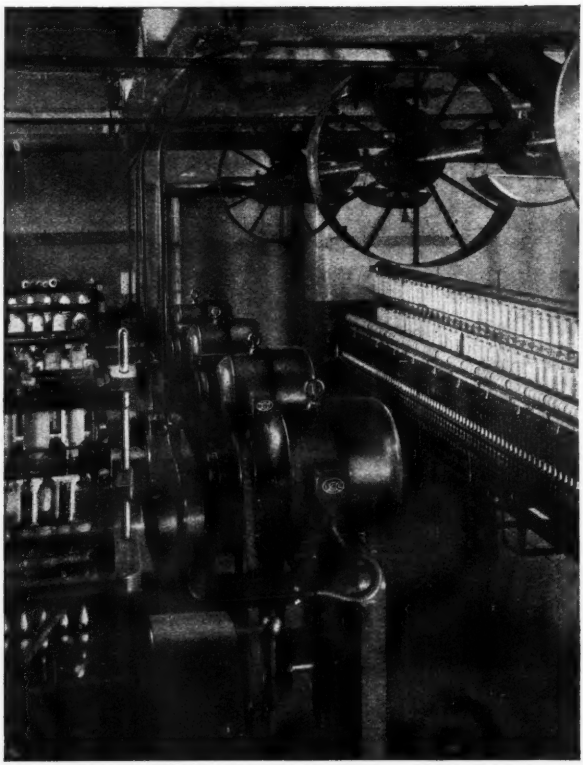

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STOCKS AND SHARES

TUESDAY EVENING.

NEWS from the Egyptian war front has been sufficiently serious to impose a fresh measure of restraint upon business in Stock Exchange securities. Prices have kept surprisingly firm in view of the developments, though in the gilt-edged market certain of the dated-stocks have gone back a trifle. For instance, London Passenger Transport "A" and "B" are both lower. Central Electricity Board issues, however, maintain their levels. Amongst industrials, the recent trend has suffered something of a check, although the actual falls in prices are comparatively trifling.

Price Fluctuations

There are no noteworthy changes in the prices of Home electricity supply companies. Bournemouth & Poole at 52s. 6d. are $\frac{1}{16}$ lower and smaller falls have taken place in British Light & Power 28s., Lancashire 34s. 6d. and Midland Counties 38s. 9d. On the other hand, West Devons are $\frac{1}{16}$ up at 22s. 6d., inquiry of late having been rather directed towards the lower-priced shares, dividends on which are deemed to carry a likelihood of expansion. Amongst Overseas shares, Calcutta Electrics further reacted to 25s., and on the Egyptian developments, Palestine Electric "A" fell 3s. to 18s. 3d. The usual dividend, making 15 per cent. for the year, has been declared on Victoria Falls & Transvaal Power ordinary shares, without this, however, preventing a fall of $\frac{1}{8}$ in the price to 75s. South Africa has recently been inclined to sell shares in her industrial undertakings. Whitehall Electric preference at 15s. 9d. are unchanged on the company's declaration of a 5 per cent. dividend, the same as that of a year ago. The dividend on the shares is cumulative and it is hoped that in due course the arrears, which are now piling up on these preference shares, will be dealt with.

Equipment and Manufacturing

Walsall Conduits 4s. shares at 36s. 3d. show a rise of half-a-crown, the recently published figures bringing in buyers. Callender's are steady at 72s. 6d.xd. The decline shown in net profit aroused no surprise in the market. Indeed, the comment on the figures was that they were quite as good as anyone could expect. The company, as the accounts show, occupies a strong financial position. Revo 10s. shares are unchanged at 28s. 9d., the reduction of 2½ per cent. to 17½ per cent. in the dividend failing, so far, to bring in sellers. India Rubber preference have gone back ½ to 18s. 9d., and amongst other falls Tube Investments and General Electrics, both at 82s. 6d., show small losses. E.M.I. at 15s. 6d. are 9d. down, due to the war news. A moderate bull account has recently been built up in the shares, and this has made the price the more vulnerable.

Miscellaneous Matters

Cable and Wireless stocks received no assistance from the statements made at the meetings last week. The preference stock is 2 points down at 100; the ordinary at 59 is 1 lower. Anglo-American Telegraphs are also easier at 110 for the preferred and 25 for the deferred. The latter stock now shows a yield of 6 per cent. on the money. Marconi Marines are unchanged at 28s. British Electric Traction deferred ordinary at 900 shows a fall of 35 points. Oddments of the stock have recently come to market and have had a disproportionate effect upon the quotation. The preferred ordinary is 10 points lower at 170. Southern Railway preferred and preference are both easier. In the Foreign group, Brazilian Tractions gave way ½ after their recent abrupt rise, but Rio 5 per cent. bonds strengthened to 99.

Six Months' Prices

The customary comparison between Stock Exchange prices at the end of June and those of six months earlier brings out, this time, few remarkable changes. Throughout the period, the main factor contributing to the general strength of markets has been the cheap money policy of the Government. This served to make values largely artificial. The Government's financial programme suffices to keep prices at a fairly high level. This in turn reacts similarly upon the front-rank preference and ordinary shares of industrial companies. There having been no issues of any consequence since the outbreak of war, the area of selection becomes continually narrower.

Gilt-Edged Stocks

Money which looks for capital appreciation at the end of the war, flows steadily into industrial ordinary shares, of which some of the best-class examples are to be found in the group of electricity supply companies, and the undertakings which are concerned with manufacturing and equipment. The purely gilt-edged list shows comparatively little change. London Electric Transport 2½ per cents., for instance, now stand at 96 against 96½ at the end of last year, while Central Electricity Board 3½ per cents. at 103½ are 1½ higher than the price at which they started the year. London Passenger Transport "A" at 41 is a point up in the six months.

Industrial Companies

The main feature in this group is the firmness of values and the comparatively slight amount of change which has taken place. For shares to satisfy prospective buyers, the market has had to rely upon sales made for

(*Concluded on page* 31)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939–40	Dividend 1940–41	Middle Price June 30	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	52/6	−1/6	4 15 0
British Power and Light	6	6	28/–	−6d.	4 5 9
City of London	7	7	27/6	..	5 1 9
Clyde Valley	8	8	40/–	..	4 0 0
County of London	8	8	37/6	..	4 5 6
Edmundson's: 7% Pref.	7	7	35/–	..	4 0 0
Ord.	6	6	28/–	..	4 5 9
Elec. Dis. Yorkshire	9	9	42/–	..	4 5 9
Elec. Fin. and Securities	12½	12½	48,9	..	5 2 6
Elec. Supply Corporation	10	10	45/–	..	4 9 0
Isle of Thanet	2	Nil	11/3	..	—
Lancs. Light and Power	7½	7½	34/6	−6d.	4 7 0
Llanelly Elec.	5½	5½	22/6	..	4 17 9
Lond. Assoc. Electric	4½	4	19/6	—	4 2 1
London Electric	6	6	25/–	..	4 16 0
London Power Red. Deb.	5	5	105½	..	4 14 7
Metropolitan E.S.	8	8	36/3	..	4 8 6
Midland Counties	8	8	38/9	−9d.	4 2 6
Mid. Elec. Power	9	9	42/–	..	4 5 9
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec. Ordinary	7	7	31/3	..	4 9 7
7% Pref.	7	7	34/6	..	4 1 2
Northampton	10	10	47/–	..	4 5 1
Notting Hill 6% Pref. (£10)	6	6	9	..	—
Northmet Power: Ordinary	7	7	35/9	..	3 18 4
6% Pref.	6	6	32/–	..	3 15 0
Richmond Elec.	6	6	25/–	..	4 16 0
Scottish Power	8	8	39/6	..	4 1 0
Southern Areas	5	5	21/3	..	4 14 0
South London	7	7	27/6	..	5 1 10
West Devon	5	5	22/6	+1/6	4 9 0
West Glos.	4½	3½	20/–	..	3 10* 0
Yorkshire Elec.	8	8	40/–	..	4 0 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	4/3	−3d.	—
Calcutta Elec.	7*	7*	25/–	−2/–	5 12 0
Cawnpore Elec.	10	10	25/–	..	8 0 0
East African Power	7	7	27/–	..	5 3 8
Jerusalem Elec.	7	5	18/9	..	5 6 8
Kalgoorlie (10/–)	7½	5	7/6	..	6 13 4
Madras Elec.	6*	4*	18/9	..	4 5 4
Montreal Power	1½	1½	23½	−1	6 7 8
Palestine Elec. "A"	Nil	Nil	18/3	−3/–	—
Perak Hydro-elec.	6	7	7/6	..	—
Shawinigan Power	83cts.	90cts.	15½	..	—
Tokyo Elec. 6%	6	6	12	..	—
Victoria Falls Power	15	15	75/–	−½	4 0 0
Whitehall Inv. Pref.	5	5	15/9	..	6 7 0

Company	Dividend 1939–40	Dividend 1940–41	Middle Price June 30	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity: 1950–70	5	5	110½	..	4 10 6
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	107½	..	4 3 7
1963–93	3½	3½	103½	..	3 7 8
1974–94	3½	3½	99½	..	3 5 4
London Elec. Trans. Ltd.	2½	2½	96	..	2 12 1
London & Home Counties 1955–75	4½	4½	112	..	4 0 4
Lond. Pass. Trans.: A	4½	4½	113½	−2	3 19 4
B	5	5	112½	−1	4 9 0
C	3	2⅞	41	..	7 0 3
West Midlands J.E.A. 1948–68	5	5	110	..	4 11 0
Telegraph and Telephone					
Anglo-Am. Tel.: Pref.	6	6	110	−1½	5 9 1
Def.	1½	1½	25	−1	6 0 0
Anglo-Portuguese	8	8	17/6	−1/16	9 2 10
Cable & Wireless: 5½ Pref.	5½	5½	100	−2	5 10 0
Ord.	4	4	59½	−1	6 15 7
Canadian Marconi $1	Nil	4cts.	5/–	..	3 7 0
Globe Tel. & Tel.: Ord.	8½*	8½*	27/6	..	—
Pref.	6	6	27/6	..	4 7 5
Great Northern Tel.: (£10)	Nil	Nil	15½	..	—
Inter. Tel. & Tel.	Nil	Nil	3½	..	—
Marconi-Marine	7½	7½	28/9	..	5 4 4
Oriental Tel. Ord.	11½*	16	47/6	..	6 14 8
Telephone Props.	6	Nil	10/–	..	—
Tele. Rentals (5/–)	10	10	9/–	..	5 11 1
Traction and Transport					
Anglo Arg. Trans.: First Pref. (£5)	Nil	Nil	5/–	..	—
4% Inc.	Nil	Nil	11½	−1	—
Brit. Elec. Traction: Def. Ord.	45	45	900	−35	5 0 0
Pref. Ord.	8	8	170	−10	4 14 2
Bristol Trams	8	10	46/3	..	4 6 4
Brazil Traction	$1	50c	14½	−½	—
Calcutta Trams	8	5½	18/3	..	6 0 9
Cape Elec. Trams	5	5	20/–	..	5 0 0
Lancs Transport	10	10	43/9	..	4 11 4
Mexican Light: 1st Bonds	5	5	85	..	5 17 0
Rio 5% Bonds	5	5	99	+1	5 1 0
Southern Rly.: 5% Prefd.	5	5	63	−1½	7 18 8
5% Pref.	5	5	106	−½	4 14 4
T. Tilling	10	10	48/9	..	4 2 0
Tilling & B.A.	7*	6½*	55/–	..	2 7 3
West Riding	10	10	39/6	..	5 1 3

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price June 30	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord. ..	Nil	7½	24/–	+1/–	6 5 0
Assoc. Elec.:					
Ord.	10*	10	45/9	..	4 7 6
Pref.	8	8	39/6	..	4 1 0
Automatic Tel.& El.	12½	12½	51/3	..	4 17 3
Babcock & Wilcox .	11	11	42/6	..	5 3 6
British Aluminium .	10	10	44/6	..	4 10 1
British Insul. Ord. .	20	20	93/9	..	4 5 6
British Thermostat (5/–)	18½	18½	16/3	..	5 13 10
British Vac. Cleaner (5/–)	12½	10	13/9	..	3 12 9
Brush Ord. (5/–) ..	Nil	6	5/9	..	5 4 3
Callender's	15	15	72/6xd	..	4 2 9
Chloride Elec. Storage	15	15	73/9	..	4 1 4
Cole, E. K. (5/–) ..	Nil	7	11/6	–3d.	3 0 10
Consolidated Signal	17	17	72/6	..	4 3 8
Crabtree (10/–) ..	17½	17½	30/–	..	5 16 8
Crompton Parkinson Ord. (5/–) ..	30	20	22/6	..	4 9 0
E.M.I. (10/–) ..	Nil	6	15/6	–9d.	3 17 5
Electric Construction	10	10	34/6	..	5 16 0
Enfield Cable Ord. .	12½	12½	55/–	..	4 11 0
Elecl. Switchgear (10/–)	10	10	20/–	..	5 0 0
English Electric ..	10	10	41/3	..	4 17 0
Ensign Lamps (5/–)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)..	22*	20*	41/3	..	2 8 6
Ever Ready (5/–) ..	40	40	32/6	..	6 3 0
Falk Stadelmann ..	7	7½	22/–	..	6 16 4
Ferranti Pref. ..	7	7	27/6	..	5 1 10
G.E.C.:					
Pref.	6½	6½	32/6	–⅛	4 0 0
Ord.	20	17½	82/–	–1/9	4 5 4
Greenwood & Batley	15	13	30/–	..	8 13 4
Hall Telephone (10/–)	10	12½	20/–	..	6 5 0
Henley's (5/–) ..	20	20	22/6	..	4 9 1
4½% Pref. ..	4½	4½	22/6	..	4 0 0
Hopkinsons ..	15	15	48/9	..	6 3 0
India Rubber Pref.	5½	5½	18/9	–⅛	5 17 6
Intl. Combustion ..	32½	30	107/6	..	5 11 6
Johnson & Phillips	15	15	60/–	..	5 0 0
Lancashire Dynamo	20	20	67/6	..	5 18 4
Laurence, Scott (5/–)	15	12½	9/6	+6d.	6 11 7
London Elec. Wire.	7½	7½	28/3	..	5 6 2
Lucas, J.	15	15	66/3	..	4 10 8
Mather & Platt ..	10	10	39/6	–6d.	5 1 3
Metropolitan Elec. Cable Pref. ..	5½*	5½	21/3	..	5 3 6
Murex	20	20	90/–	–⅛	4 9 0
Pye Deferred (5/–).	25	25	16/3	..	7 13 10
Revo (10/–) ..	20	17½	28/9	..	6 1 9
Reyrolle	12½	12½	57/6	..	4 7 0
Siemens Ord. ..	7½	7½	26/3	–⅛	5 14 3
Smith, S. (1/–) ..	50	37½	7/–	–6d.	5 7 2
Strand Elec. (5/–)..	2	4	3,9	+3d.	5 6 8
Switchgear & Cowand (5/–) ..	15	10	10/–	..	5 0 0
T.C.C. (10/–) ..	Nil	5	15/–	..	3 6 8
T.C. & M.	10	10	42/6	..	4 14 0
Telephone Mfg. (5/–)	9	9	9/3	..	4 17 3
Tube Investments .	23¾	20	82/6	–⅛	4 17 0
Vactric (5/–) ..	Nil	Nil	6/–	..	—
Vickers (10/–) ..	10	10	16/3	..	6 3 3
Ward & Goldstone (5/–)	20	20	18/6	..	5 8 3
Westinghouse Brake	10	10	47/6	..	4 4 2
Walsall Conduits (4/–)	55	55	36/3	+½	6 4 6
West, Allen (5/–) ..	7½	7½	5/9	..	6 10 5

*Dividends are paid free of Income Tax.

Stocks & Shares (*Continued from page* 29)

deceased accounts and for holders who required cash to cover other commitments. War taxation has contracted profits in a manner which expansion of earnings and turnover has not been able to counteract. Some of the alterations on the working of the first six months of this year are as follows:—

Ordinary Shares	Dec. 1941 s.	Dec. 1941 d.	June 1942 s.	June 1942 d.	Rise or Fall
Assoc. Electrical Ind.	43	9	45	9	+2/–
Babcock & Wilcox ..	45	0	42	6	–½
British Aluminium ..	45	9	44	6	–⅛
British Insulated ..	90	0	93	9	+⅜
Callender's	73	9	72	6	–⅛
Crompton Parkinson (5s.)	21	3	22	6	+⅛
English Electric ..	37	6	41	3	+⅜
G.E.C.	78	9	82	0	+3/3
Ever Ready (5s.) ..	29	6	32	6	+3/–
Henley's (5s.) ..	22	6	22	6	—
Johnson & Phillips ..	55	9	60	0	+4/3
J. Lucas	65	0	66	3	+⅛
Siemens	25	0	26	3	+⅛

Electricity Supply

Changes in the prices of the ordinary shares of London electricity supply companies are comparatively slight. Taking a group of half-a-dozen representative examples, the following table shows the somewhat irregular trend of the half year's working:—

Ordinary Shares	Dec. 1941 s.	Dec. 1941 d.	June 1942 s.	June 1942 d.	Rise or Fall
City of London ..	26	3	27	6	+⅛
County of London ..	35	0	37	6	+⅛
London Assoc. Elec.	19	6	19	6	—
Metropolitan ..	36	3	36	3	—
Northmet Power ..	35	0	35	9	+9d.
South London ..	25	0	27	6	+⅛

Throughout the six months, there has been a strong market in the Scottish and Provincial companies' shares, as these prices suggest:—

Ordinary Shares	Dec. 1941 s.	Dec. 1941 d.	June 1942 s.	June 1942 d.	Rise or Fall
Bournemouth & Poole	53	9	52	6	–⅛
Clyde Valley ..	37	6	40	0	+⅛
Elec. Dis. Yorks. ..	42	0	42	0	—
Lancs. Light & Power	33	9	34	6	+9d.
Midland Counties ..	37	6	38	9	+⅛
Midland Elec. Power	39	6	42	0	+⅛
North Eastern ..	29	6	31	3	+1/9
Northampton ..	44	6	47	0	+⅛
Scottish Power ..	38	9	39	6	+9d.
Yorkshire Elec. ..	39	6	40	0	+6d.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *can be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1939

29965. "Manufacture of electrical insulating materials." Ges. zur Forderung der Forschung auf dem Gebiete der Technischen Physik an der Eidgenossischen Technischen Hochschule. November 11th, 1938. (Sample furnished.) (Cognate applications, 29966–7/39.) (545551.)

1940

9701. "Low-capacity multiple-conductor connections." Philips Lamps, Ltd. June 5th, 1939. (545571.)

12274. "Separation of materials of different specific gravities." M. A. Walker and General Electric Co., Ltd. July 29th, 1940. (545687.)

15130. "Electric plug-and-socket couplings." D. Jackson and Pye, Ltd. October 10th, 1940. (545602.)

15599. "Colour television apparatus." J. L. Baird. October 23rd, 1940. (545603.)

15977. "Speed governor for electric motors." W. C. Fairweather (Singer Manufacturing Co.). November 1st, 1940. (545605.)

16256. "Improvements relating to the construction and arrangement of electrodes in electron discharge devices." Electrical Research Products, Inc. December 2nd, 1939. (545689.)

17066. "Sparking plugs for internal-combustion engines." E. Zanzi. November 29th, 1940. (Convention date not granted.) (545607.)

17149. "Fastening of blades to discs of turbines, compressors and similar machines." H. G. C. Fairweather (Svenska Turbinfabriks Aktiebolaget). December 2nd, 1940. (Convention date not granted.) (545577.)

17151. "Electric signal detecting circuits." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1939. (545577.)

17180. "Electrical terminal sockets for plug-and-socket connectors." F. G. Gillard and Plessey Co., Ltd. December 2nd, 1940 (545579.)

17271. "Selecting switches for use in automatic telephone or like signalling systems." Automatic Telephone & Electric Co., Ltd., and G. T. Baker. December 4th, 1940. (545634.)

17313. "Apparatus for electro-deposition." Westinghouse Brake & Signal Co., Ltd., and D. Ashby. December 5th, 1940. (545663.)

17330. "System for changing the frequency of electric oscillations." Marconi's Wireless Telegraph Co., Ltd. December 6th, 1939. (545690.)

1941

476. "Permanent-magnet structures." British Thomson-Houston Co., Ltd. January 12th, 1940. (545583.)

607. "Plug-and-socket members for electrical connections." Cinch Manufacturing Corporation. February 1st, 1940. (545612.)

843. "Ignition plug connections for internal-combustion engines." British Thomson-Houston Co., Ltd., and L. Griffiths. January 22nd, 1941. (545584.)

1097. "Combined electric switch and socket units." W. G. Fisher. December 4th, 1941. (545639.)

1401. "Frequency-modulated carrier translating systems." Hazeltine Corporation. March 1st, 1940. (545586.)

2148. "Periodic-wave repeaters." Hazeltine Corporation. January 20th, 1940 (545591.)

2572. "Low-voltage protective electric-discharge devices." Westinghouse Electric International Co. February 29th, 1940. (545677.)

2739. "Gaseous electric-discharge lamps." Westinghouse Electric International Co. March 1st, 1940. (545592.)

2914. "Electricity conductor unit with fixed socket-end conductors." L. G. Morten. February 23rd, 1940. (545647.)

3424. "Screen caps for thermionic valves." Carr Fastener Co., Ltd., and G. Wagstaff. March 13th, 1941. (545595.)

3490. "Resistance composition and method of making it." Standard Telephones & Cables, Ltd. May 23rd, 1940. (Addition to 540844.) (545679.)

3611. "Electric water heaters and heating elements therefor." Worcester Windshields & Casements, Ltd., and H. Southall. March 17th, 1941. (545596.)

3612. "Electric water heaters." Worcester Windshields & Casements, Ltd., H. Southall and C. L. Hill. March 17th, 1941. (545597.)

3614. "Storage water heaters." Worcester Windshields & Casements, Ltd., and H. Southall. March 17th, 1941. (545680).

3685. "Electrodes for sparking plugs." J. C. Chaston and S. G. Pertwee. March 18th, 1941. (545681.)

5356. "Receiving circuit for a signalling system." Standard Telephones & Cables, Ltd. May 1st, 1940. (545599.)

6288. "Systems for electric circuit control, particularly for illumination control." Igranic Electric Co., Ltd. May 20th, 1940. (545600.)

7125. "Arrangement for the supervision of the insulation of electrical trolley-buses." Allmanna Svenska Elektriska Aktiebolaget. April 1st, 1940. (545684.)

10894. "Electric couplings." F. G. Gillard and Plessey Co., Ltd. November 28th, 1940. (Divided out of 17023/40.) (545692.)

11001. "Inductively coupled coils." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips Gloeilampenfabrieken). August 28th, 1941. (545685.)

11826. "Electro-magnetically operated circuit controllers." British Thomson-Houston Co., Ltd. September 17th, 1940. (545623.)

12722. "Air purifying apparatus." British Thomson-Houston Co., Ltd. October 2nd, 1940. (545564.)

14701. "Electric switches with roller contacts." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). November 14th, 1941. (545567.)

Parliamentary News

By our Special Reporter

Raw Material Supplies

IN moving the Colonial Office Vote on June 24th, Mr. Macmillan, Under-Secretary for the Colonies, said that the loss of the British Far Eastern possessions had involved the loss to us of 60 per cent. of the world's tin production and 90 per cent. of the rubber. In addition we had lost a large proportion of wolfram, lead and other materials, and we were threatened with further interference with sources of supply.

Steps were being taken to mitigate the position. Rubber output in Ceylon, already at a high level, had been intensified ; steps had been taken to obtain the greatest possible production in East and West Africa ; and abandoned areas of Ceara rubber, mainly in Tanganyika, were being revived. For these purposes the services of some of the Malayan planters were being used. By these means it was hoped to fill the gap before the production of synthetic rubber in the United States was increased.

Bauxite, wolfram, tin, graphite, copper, zinc, mica, manganese, chrome and iron ore were being obtained from vast areas in the Gold Coast, Sierra Leone, Nigeria, Northern Rhodesia, Ceylon, British Guiana and Cyprus. But the main problem was not so much the increasing of the productive power of these territories, as the securing of transport, harbour accommodation and shipping to deal with the products.

Fixed and Minimum Charges

In reply to a question by Mr. Colgate, Major Lloyd George said that the whole question of fixed and minimum charges was being examined in consultation with the electricity and gas industries from the point of view of economy in fuel.

Motor Maintenance

Suggested Precautions

SIMPLE methods of preventing breakdowns of electric motors which might delay war production are given in some notes we have received from Crompton Parkinson, Ltd. In the first place, cleanliness : since dirt impedes ventilation and carbon dust results in low insulation resistance, any accumulation should be blown out, particular attention being paid to insulated brush spindles, brush-holders and spaces between commutator lugs or risers, where fitted. The commutator should be wiped occasionally with a clean soft rag to remove grease as well as dust.

As a check against overloading, the current taken can be ascertained without stopping the motor by means of a "tong-test," the tongs being closed round the lead to the motor. As the tongs are opened and closed by means of a trigger, only one hand is used. The instrument, which has no electrical windings, weighs about 2lb.

Equal spacing of brushes and tight clamping of spindles are essential ; spacing can be checked by winding a strip of paper round the periphery of the commutator. Sparking at slip-rings usually originates in excessive starting or running current, vibration (*e.g.*, from gear drive), wear of rings, worn or sticking brushes or insufficient brush pressure.

Brushes should be replaced before they have worn down to ¼ in. Sticking of brushes is generally due to dust. Carbon dust due to wear of brushes is also deposited on insulation surfaces and may cause a flashover in starting.

Brush pressure should not fall below 2½ to 3 lb. per sq. in. of brush surface for AC motors and 2 to 2½ lb. for DC motors. Pressure can be checked by means of a small spring balance. Brush-holder springs must bear squarely on the tops of the brushes and the brushes must slide freely in their boxes. Only the correct grade of brushes should be used for replacements, and they must be bedded to fit the curvature of the commutator or slip-rings with the rough surface of the emery cloth facing the brush.

Slip-rings may be smoothed by holding carborundum cloth (No. 1 first, finishing with F.F.) under light pressure to the rings while rotating at speed, all dust being carefully removed. When DC commutators have been turned or ground, the edges of the copper should be slightly bevelled by drawing a sharp "V" tool between segments.

Winding insulation should be tested at least twice a year. Any loss of grease from bearings should receive prompt attention in order to prevent damage from formation of rust or heating of the cages. A high melting-point grease should be chosen when a high ambient temperature might cause ordinary grease to melt and run out of the bearing housing. Grease must not contain moisture, alkali or filler.

TRADE MARK APPLICATIONS

AMONG recent applications for British trade marks are the following, objections to any of which may be entered within a month of June 24th.

MAGNESYN. No. 615893, Class 9. Transmitting and receiving apparatus for electric signalling systems. Bendix Aviation Corporation, also trading as Pioneer Instrument Division, Bendix, Bergon County, New Jersey, U.S.A. Address for service: c/o F. J. Cleveland & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

BICOLON. No. 618222, Class 9. Also BICOMEL. No. 618456, Class 9. Electric wires and cables. British Insulated Cables, Ltd., Prescot, Lancs.

HOLOPHANE. No. 618623, Class 9. Light measuring and gauging instruments. Holophane, Ltd., Holophane House, Elverton Street, London, S.W.1.

MUREX. No. 618645, Class 9. Weighing and measuring apparatus and parts thereof. Murex, Ltd., Ferry Lane, Rainham, Essex.

LINAGLOW. No. 618664, Class 9. Electric kettles, flat irons and soldering irons. Also No. 618209, Class 11. Electric fires, boiling rings, toasters, cookers, fans and immersion heaters. H. H. Linton & Co., Ltd., 2, Highgate High Street, London, N.6.

DURATUFLEX. No. 617971, Class 17. Flexible tubing (non metallic). Duratube & Wire, Ltd., 16, Hanworth Road, Feltham.

BICOLAC. No. 618347, Class 17. Electrical insulating varnish. British Insulated Cables, Ltd., Prescot, Lancs.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Normanton.—July 11th. Electricity Department. Supply, delivery and laying of 440 yd. of e.h.v. cable and supply, delivery and fixing of one e.h.v. switch cubicle with instruments. Specifications from electrical engineer, Electricity Department. (June 26th.)

Plymouth.—July 7th. Electricity Supply Department. Portable loading conveyor. (June 26th.)

Wolverhampton.—July 13th. West Midlands Joint Electricity Authority. High-voltage and low-voltage cables. (June 26th.)

Orders Placed

Glasgow.—Electricity Sub-Committee on Finance and Works. Accepted. One 6,000-kVA transformer (£3,152).—Bruce Peebles & Co.

London.—FULHAM.—Accepted. Handling plant for boiler riddlings (£2,426).—Babcock & Wilcox.

JOINT ELECTRICITY AUTHORITY. — Annual contract for kiosks renewed for a further twelve months from May 31st.—Crompton Parkinson, Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editor.

Anglesey.—Water supply, engine and pump houses, for R.D.C.; Henry Adams & Son, consulting engineer, Fron Heulog, Bangor.

Barnsley.—Nurseries at Burton Grange and Wilthorpe School (£1,000 each); H. Taylor, borough surveyor, Town Hall.

Bideford.—Water supply scheme (£2,482), for R.D.C.; clerk, Market Place.

Blackwell.—British Restaurant, Shirebrook; A. H. Elliott, surveyor, Dale Close, Chesterfield Road South, Mansfield.

Brighouse.—Alterations and additions to municipal buildings; H. A. Sneezum, borough surveyor, Commercial Street, Brighouse.

Brighton.—Feeding centre, St. James' Street (£2,350); borough engineer.

Cheetham.—Warehouse and offices; T. Campion & Son, building contractors, Devonshire Street, Ardwick.

Coventry.—Shopping centre, Broadgate, Smithford Street, West Orchard and Corporation Street; D. E. E. Gibson, city architect, 1A, Warwick Row.

Durham.—Adaptation and equipment of premises in connection with school meals plan (£86,000), and establishment of nursery classes (£5,000); county architect, 34, Old Elvet, Durham.

Farnborough (Hants).—Additional British Restaurant (£3,300); Surveyor's Department, Town Hall, Farnborough, Hants.

Gatley.—New church of St. Catherine, Heald Green; Rev. W. Grimwood, St. Catherine's Heald Green, Gatley, Ches.

Halesowen.—Hutments for N.F.S.; G. Spurr, borough surveyor, Council House.

Huyton-with-Roby.—Erection of buildings for school premises for Lancashire Education Committee; John Lucas & Sons (Builders), Ltd., Eccleston Street, Prescot.

Kenilworth.—Remand home for 240 boys, Glasshouse Lane; A. C. Bunch, county architect, Shirehall, Warwick.

Littleborough.—Wartime day nursery, Townhouse Road; A. Evans, county architect, County Offices, Preston.

London.—FULHAM.—Two nurseries (£3,015); borough engineer.

Ludlow.—Public cleansing station; Capt. W. G. Lane, borough surveyor, Town Hall.

Morley.—Works canteen; H. Hardy, Ltd., Rods Mill.

Northampton. — Extensions to canteen for Transport Department; borough surveyor.

North Riding.—Erection of cooking depots at Yarm and Guisborough (£2,000); D. Oakley, Ltd., builders, Northallerton.

Portsmouth. — Erection of police station (£1,500); F. J. Sparks, town clerk, Royal Beach Hotel, Southsea.

Rawtenstall.—School canteens; education secretary.

Salford.—Offices for Transport Department and additional wartime day nurseries; W. A. Walker, city engineer, Town Hall, Salford 3.

Stranraer.—British Restaurant in London Road; burgh surveyor.

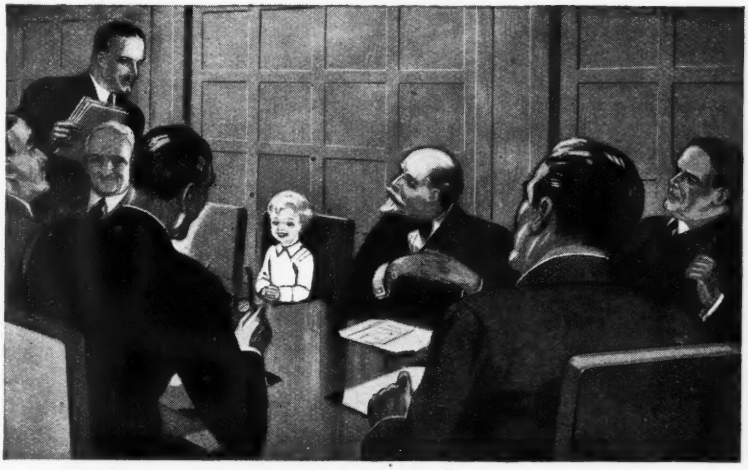
Wallingford.—Erection of hostel, Clapcot Way; borough surveyor.

Wallsend-on-Tyne.—Feeding centre at Richardson Dees School; J. H. James, East Farm, High Street East.

West Riding.—Enlargement of kitchens at 19 schools and provision of canteens at 11 other schools; county architect, County Hall, Wakefield.

Weymouth.—Erection of cleansing station; borough surveyor, 6, Pulteney Buildings, Weymouth.

Wisbech.—Maternity home accommodation, for Isle of Ely Maternity and Child Welfare Committee; R. D. Robson, county architect, County Hall, March.



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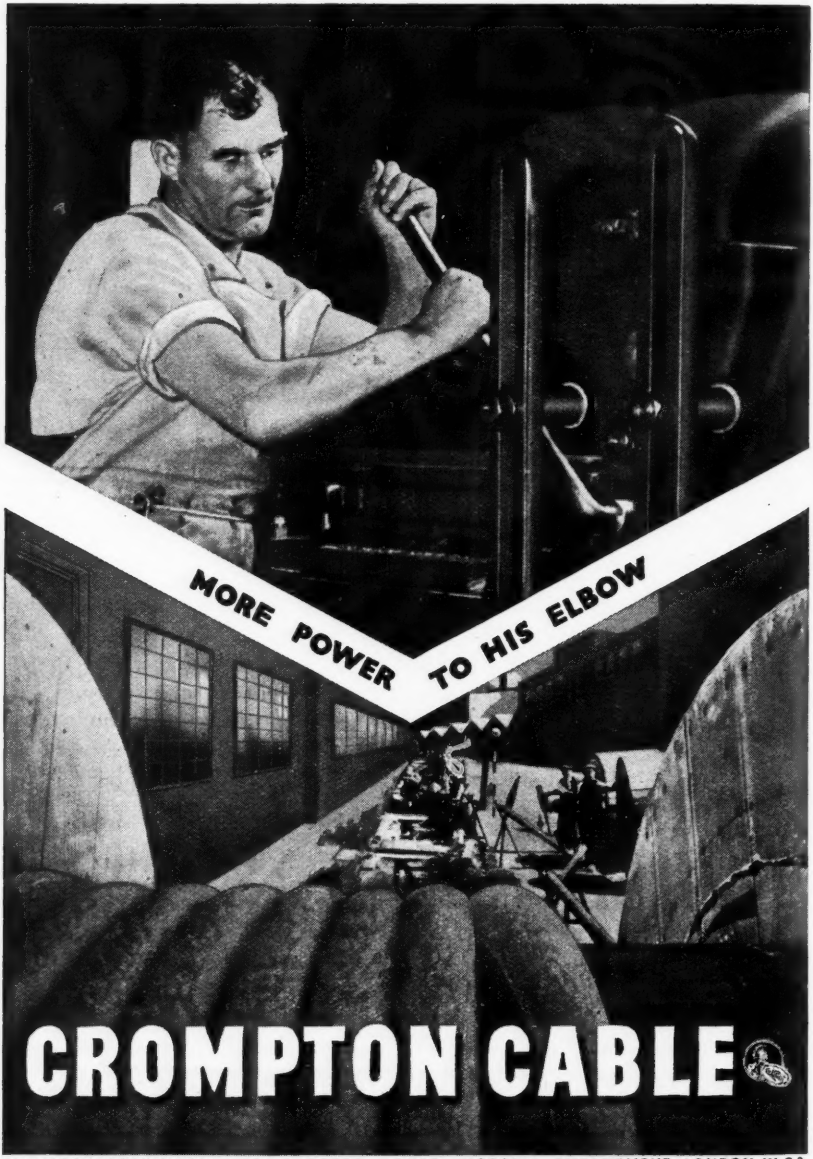

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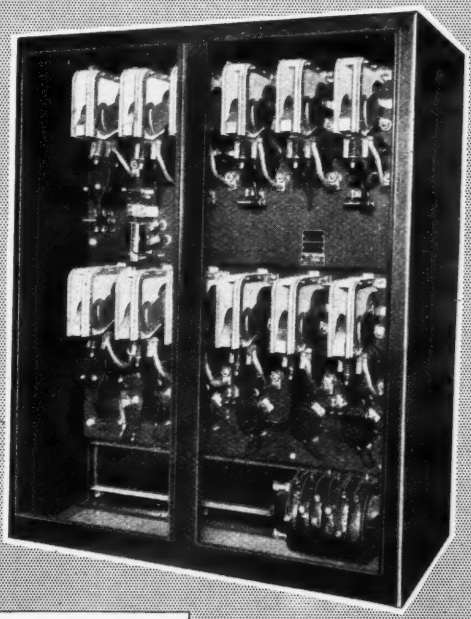

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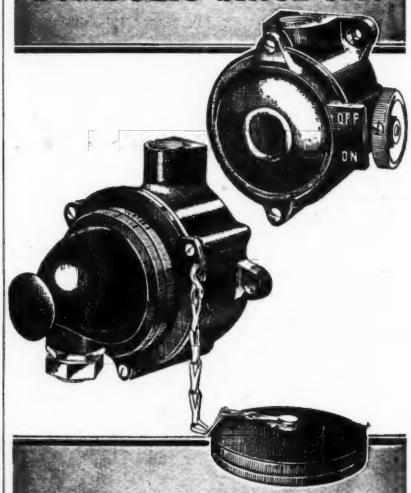

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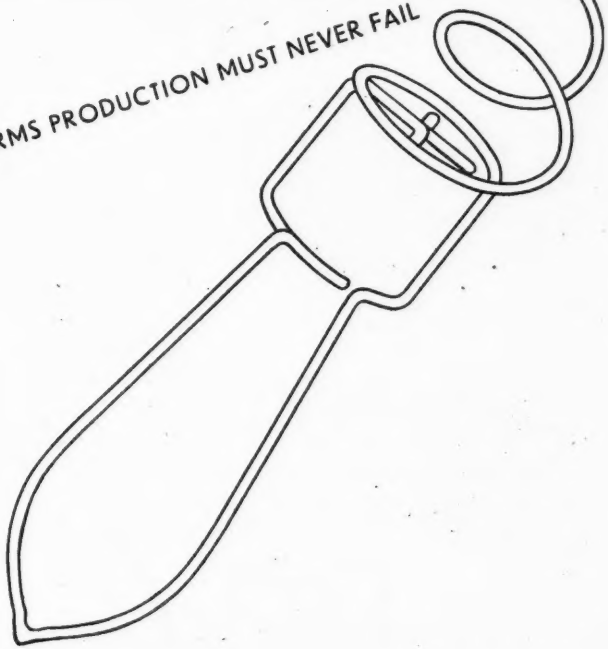

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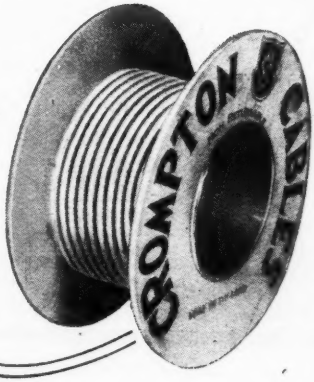

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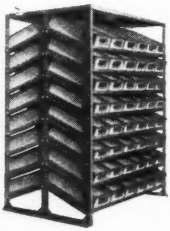

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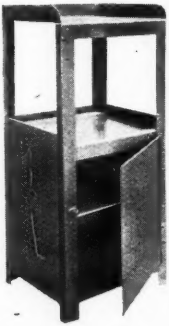

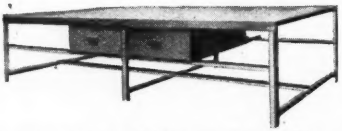

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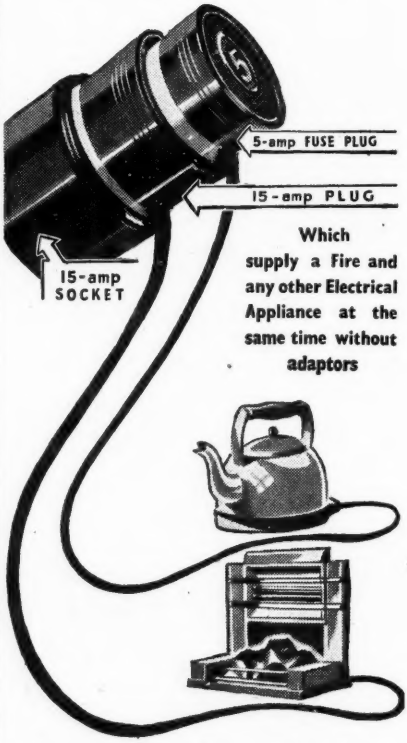

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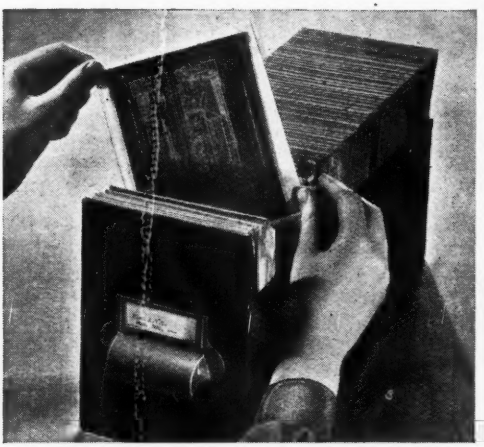

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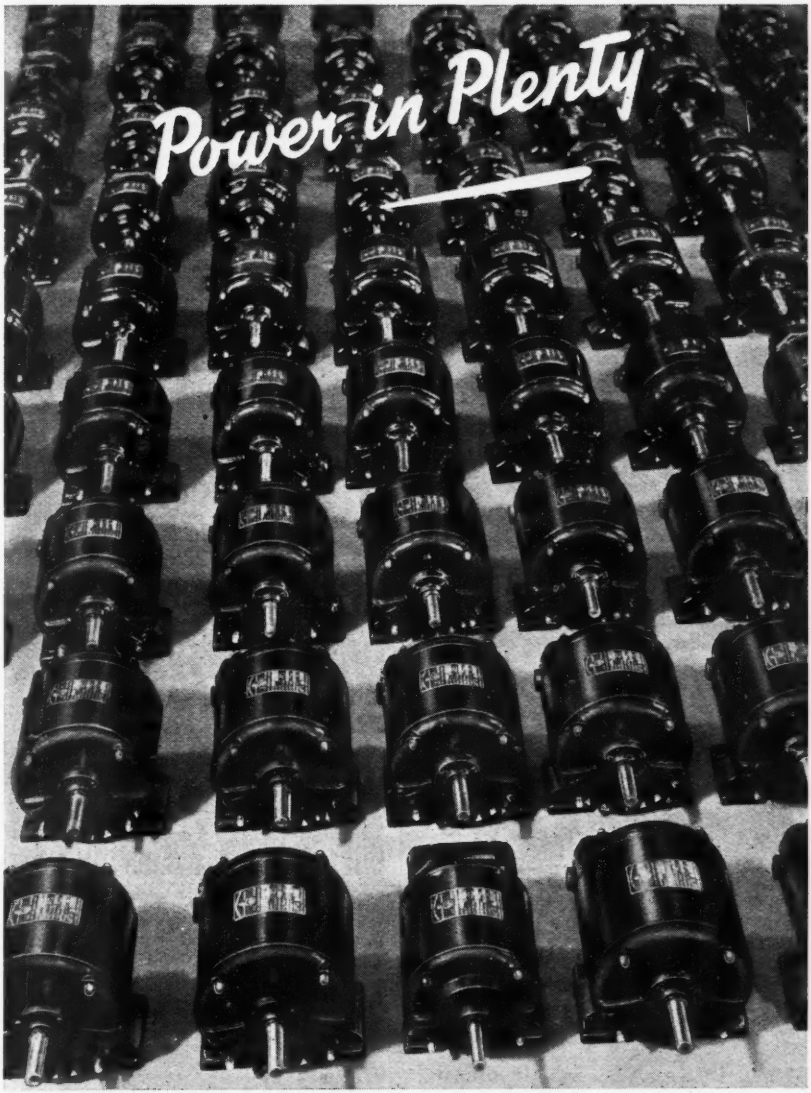

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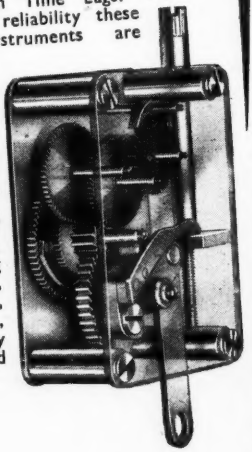

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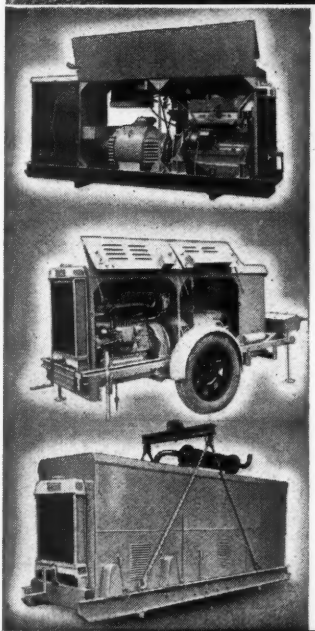

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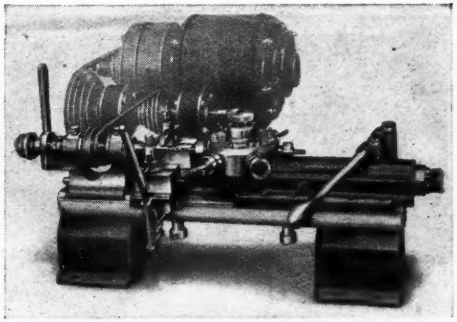

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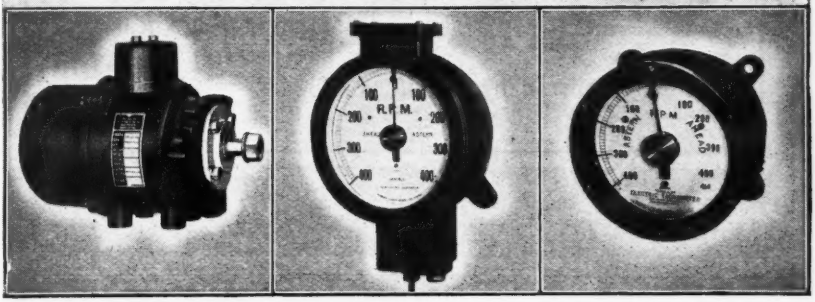

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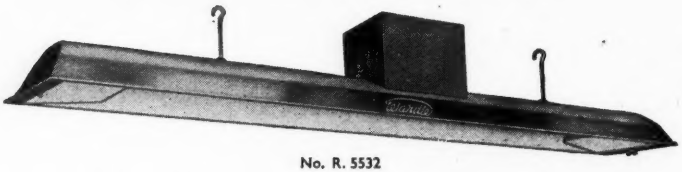

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Chain or tube suspension. With or without gear box.

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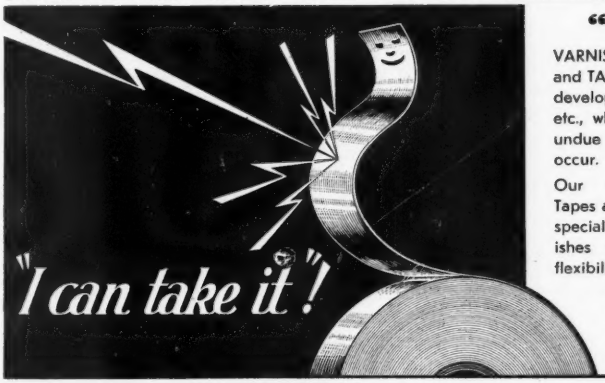

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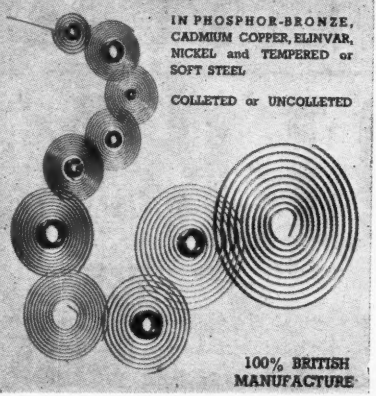

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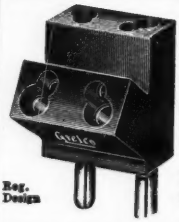

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Whilst producing to maximum capacity, orders can be dealt with in rotation.

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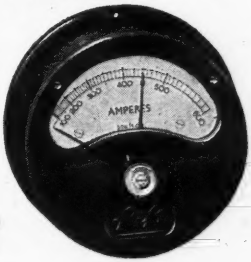

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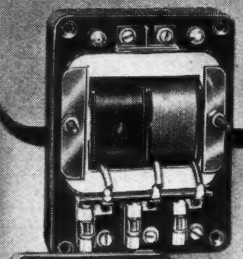
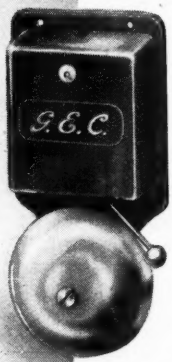


Note the three fuses in the transformer, one to each pole on the secondary side, thus complying fully with I.E.E. Regulations No. 210.



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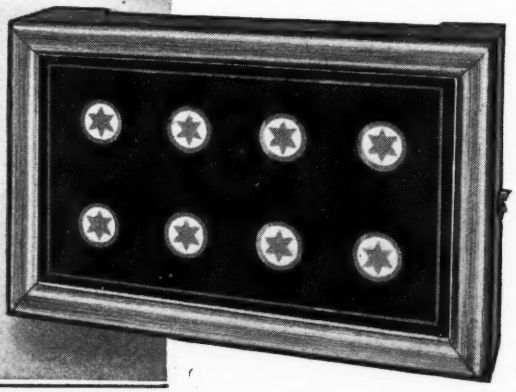
G.E.C. quality is being rigorously maintained



***NATIONAL EMERGENCY.** Please assist by saving packing material for collection when our van calls.*

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First post on Monday,** at Dorset House, Stamford Street, London, S.E.1.

THE CHARGE for advertisements in this section is 2/- per line (approx. 8 words) per insertion, minimum 2 lines 4/-, or for display advertisements 30/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies.

SITUATIONS WANTED.—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES TO advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD. and crossed.

Original testimonials should not be sent with applications for employment.

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APPLICATIONS are invited from men having experience in the paralleling of large turbo-generators and the control of a large electric supply system. Applicants must have received a sound technical training and had good general engineering experience.

Salary would be in accordance with the E.P.E.A. Schedule, Grade 9, Class "K." The successful candidate would be required to pass a medical examination in order to qualify him for the Company's Pension Scheme.

Applications, stating age, qualifications and experience, and enclosing copies of testimonials, should be addressed to:—

Superintendent Engineer,
Deptford East Power Station,
Stowage Wharf,
S.E.8.

2204

NOTTINGHAMSHIRE EDUCATION COMMITTEE

County Tehnical College, Worksop

Principal: A. E. Fox, M.C., B.Sc., B.Sc.(Eng.).

APPLICATIONS are invited for the permanent (or temporary) post of full-time Lecturer, to commence duties mid-September. Candidates should possess either a degree (preferably with Honours) in electrical engineering or its equivalent, and they should also have had some practical experience. Practice in teaching would be regarded as an additional qualification. The successful candidate will be required to teach to the standard of the Higher National Certificate. Salary according to the Burnham Scale with increments for approved industrial experience. Payment as a post of special responsibility may be made. Particulars of the post and a form of application, which must be returned before July 20th, 1942, may be obtained from the Principal. 2207

BATTERSEA BOROUGH COUNCIL

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APPLICATIONS are invited for appointment as Laboratory Assistant (male or female) at the Lombard Road Power Station.

The duties include coal, water and oil testing, together with the maintenance of technical records, and applicants must have had previous experience in laboratory work. The appointment will be a temporary one. Salary up to £4 per week, depending on qualifications and experience.

Applications in writing, giving full particulars of training and experience, stating age and when duties can be commenced, and enclosing copies of three testimonials, to be sent not later than 8th July, 1942, to Mr. H. F. J. Thompson, M.I.E.E., General Manager and Engineer, "Electric House," 204, Lavender Hill, Battersea, S.W.11. 2201

ASSISTANT to Chief Accountant. Applicant must have had experience in electricity accounts and general office control, salary £225, inclusive. The selected person will have to be medically examined and contribute to an endowment fund.—Box 698, Robertson & Scott, Edinburgh, 2. 7959

CLERICAL Assistant required in stores office. Must have a good knowledge of electrical material as handled by wholesalers. Apply—London Electrical Company, 92, Blackfriars Road, S.E.1. 33

ELECTRICAL Engineer required for technical service and development work by company manufacturing insulating materials. Applicants should state age, qualifications and experience to—Box "E.R.," c/o Dawson's, 129, Cannon Street, London, E.C.4. 2196

ELECTRICAL Engineer required, with wide and successful experience, estimating and supervising Government and private contracts for wiring and equipment of buildings. Appointment is superannuable and offers good prospects. Write, stating age, fullest particulars of experience and salary required, to—G. N. Haden & Sons, Ltd., 19/29, Woburn Place, London, W.C.1. 2169

GENTLEMAN required, over military age, used to estimating and supervising medium-size jobs, near city London. State age, experience and salary required. —Box 37, c/o The Electrical Review.

PRACTICAL Designer for electrical development required by firm of electrical contractors. Applicant must be capable of building up and establishing manufacturing side to business.—Box 7960, c/o The Electrical Review.

PRODUCTION Foreman for North of England electric lamp works. Must be exempt from military service and have wide experience in all phases of electric lamp manufacture.—Box 2193, c/o The Electrical Review.

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WANTED, experienced Manager-Foreman Contact Maker, good salary, permanent position with quick progress. All expenses paid for interview, etc.—W.D.C., 7, Back West Crescent, St. Annes-on-Sea. 2182

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Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision. We will then insert a notice free of charge under this heading.

BOX 2039. Power Station Superintendent.

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ELECTRICAL and Mechanical Engineer, A.M.I.E.E., returned from abroad, desires responsible post, maintenance and constructional.—Box 7952, c/o The Electrical Review.

ELECTRICAL Buyer and Distributor, thoroughly conversant with all markets, creative ability, offers services and equipment, including ton van and saloon car, to firms engaged on national effort.—Box 7961, c/o The Electrical Review.

MAINS Foreman or Constructional Assistant, O.H., U.G., switchgear, preferably rural supply, good practical and technical qualifications, accept lower grade with prospects.—Box 7958, c/o The Electrical Review.

MECHANICAL and Electrical Supervisor, age 46 yrs., O/H line and U/G cables, transmission and distribution, S/S and power house switchgear erection, also change over schemes, D.C./A.C. Complete installations supervised, free June 30th, 1942.—Box 7949, c/o The Electrical Review.

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SHIFT Engineer, 45, Class F, desires change. Has release permit. Would consider junior or control engineer larger undertaking. N.W. England or Midlands. —Box 7954, c/o The Electrical Review.

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(2) 3 Generating Sets (2 70 kW, 1 80 kW), Ricardo Petrol Engines, Siemens & Crompton Dynamos (one on trailer).
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(4) 3-kW Lister D.C. Generating Sets, 110 v.
(5) 2 New Mather & Platt, drip-proof, 120-v. D.C. Generators, 750 amps.
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Plant for Disposal

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1. ONE Steam Reciprocating Feed Pump by J. P. Hall, double acting, 200 lbs. pressure.
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3. FOUR 16" Hydraulic Valves with hand wheels.
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5. ONE 30" Exhaust Steam or Hydraulic Valve.
6. A quantity of 2½-, 5- and 10-amp. Siemens-Schuckert Meters.

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Electric House,
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Driver Harris Advance Wire

879 lbs. 5 m/m. 442 lbs. 4 m/m.

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400 v., 3-ph., 50 cycles.

200 h.p., 485 revs., S.R., Mather & Platt, 3 bearing type.
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100 ,, 585 ,, ,, Brush Elec. Co., 2 ,, ,,

All complete with Ellison Starting Gear.

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217a

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Stock

Reconditioned A.C. and D.C. Motors and Starters Equal to New.

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Day and night service. MACaulay 4555.

17

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ROTARY Converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 16

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1 500-v. Bridge Megger; Megger only, £30.—Shimwell, 13, Bury Street, E.C.3. 2195

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500 Electric Motors, Dynamos, Transformers, Converters, etc., etc. at low prices.—S. C. Bilsby, A.M.I.C.E., A.M.I.E.E., Crosswell Road, Langley, near Birmingham. Phone, Broadwell 1359. 21

1,000-kW Motor Generator Plant for sale, 6,600/3/50 c. input, 460 D.C. output, 3-wire.—Universal, 221, City Road, London, E.C.1. 29

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WANTED, to buy for cash, Nickel Chrome Wire, any gauge and quantity. Full particulars to—Box 2197, c/o The Electrical Review.

WANTED, Rotary Converters, any size.—Universal, 221, City Road, London, E.C.1. 22

WANTED, 200-amp., 30/50-volt, dropping characteristic welding generator, preferably with 400/3/50 motor.—Fyfe, Wilson & Co., Ltd., Bishop's Stortford. 2219

WANTED, 11,000/420-volt, 600-kVA Transformer.—Box 2221, c/o The Electrical Review.

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E. & A. Research Corporation have facilities in their well-equipped laboratories for conducting all kinds of electro-physical tests and measurements. Officially approved for various plastic and other tests. Expert consulting and advisory service always available. Research and investigations undertaken. Write—E. & A. Research Corporation, 227/229, Hammersmith Road, W.6. 7918

COMPANY MEETINGS

CABLE & WIRELESS, LTD.

(The Operating Company)

Dividend of 4 per cent.

THE 13th Ordinary General Meeting of the above Company was held on Wednesday, 24th June, in London.

Sir Edward Wilshaw, K.C.M.G. (chairman and managing director) said that the accounts disclosed a profit of £2,928,349, after providing £129,689 for cable renewals and £155,000 for amounts written off the cost of terminating a joint purse agreement and other expenditures. Adding the balance brought forward, there was £4,541,956 available. The interim dividend of 1½ per cent. already paid, together with a final dividend of 2½ per cent., making 4 per cent. for the year, absorbed £1,200,000, leaving £3,341,956 to be carried forward, and that sum was available for any Excess Profits Tax which might be assessed and for other purposes.

The company's Expeditionary Force Message, or E.F.M. service, enabled the Forces overseas and their folks at home, whether here or in any part of the Empire, to send messages to each other at the special low rate of 2s. 6d. Owing to the mobility of troops in the field and to the many difficulties inseparable from the conditions of active service, they had not always and in all cases been able to maintain with that service what they themselves regarded as the normal speed of delivery for those overseas telegrams handled over their system. The bulk of it went through satisfactorily, but there were occasions and individual cases where the delay caused them concern. There was, however, no doubt of its amazing popularity. Last Christmas period they handled over 1,250,000 E.F.M. messages.

The pictures in the Press depicting the events of yesterday, photographed in all the distant theatres of war and of preparation for war, were handled over their wireless picture system, which had been and was being greatly improved and extended to meet a constantly growing demand. They had made efforts to give the widest possible facilities for Press traffic within the Empire which played so great a part in the Empire effort. They had made further drastic reductions in rates, and had introduced an Empire rate for Press traffic of 1d. a word for the duration of the war. The importance of that further development became ever more evident as the area of war extended.

His final word must be about the staff. At the last meeting he reported that some had lost their lives through enemy action, and he must now with profound regret report that the list lengthened. In the Far East many were interned and many missing, and there were others who would not return. In the constant, necessary movement of staff throughout a world-wide system they had been singularly fortunate, but they had nevertheless lost brave colleagues travelling to or from duty in the service of the communications on which so much depended. In the overseas telegraph service of the Empire they were not unaccustomed to the perils of war, and the staff, who mourned their comrades, carried on through storm or calm with the same courage and devotion they had always shared with them.

The Report was unanimously adopted.

THE LONDON ELECTRIC WIRE & SMITHS LTD.

THE thirty-third annual general meeting of the above Company was held on 26th June, in London.

Mr. W. J. Terry (chairman and managing director) in the course of his speech, said: The profit and loss account balance of £89,581, after fully providing for taxation and contingencies, shows a reduction of £8,435, which may be regarded as satisfactory in existing circumstances.

The company's plant and machinery have been wholly occupied on production for essential services. The existing statutory allowances for wear and tear are insufficient to maintain our plant and machinery in good working condition and extra provision for depreciation has therefore been made in the accounts.

The bargaining for higher wages by trades unions has been in evidence throughout the year, causing extra strain upon the management already working with a depleted staff. It is unfortunate that this practice cannot be suspended and wages dealt with on a national basis for each industry, thus preventing this extra strain upon the management and dissatisfaction among the workers, which is not helpful to the war effort. The trades unions have already been rightly protected by the "Restoration of Pre-war Trade Practices Act 1942" for peace-time conditions when they return. The aim and object of all should be to promote effective and harmonious working arrangements.

There has been much Press comment (without effect) upon the excess profits tax at 100 per cent., which takes everything above the earnings of the standard period, whether the standard period was favourable or unfavourable, except for the somewhat nebulous 20 per cent. post-war refund.

Statistics presented by the "Economist" in their issue of the 6th June show that net profits ranging over 2,000 companies have been reduced by more than half since 1938. The position facing many companies to-day is that their liquid resources will be seriously strained, which will eventually lead to borrowings in order to meet current commitments. In addition there is the grievance that revenue wear and tear allowances are insufficient to meet the existing heavy depreciation of plant and machinery.

Cost investigations are an added burden and it is hoped that these may soon be reduced by reason of the data already acquired by Government Departments.

During the past year some Government Departments have co-operated with the trade associations with which this company is connected, to the advantage of all concerned, which has been a definite help to the war effort.

The future must remain obscure until victory is in sight.

It is, however, of some concern to manufacturers to be placed in a position to produce goods at prices which will enable them to recapture lost markets after the war.

After hostilities have ceased there will be many and great problems to be solved and the outstanding expectation would appear to be that the future will demand service from all parties commensurate with the reward to be received.

The report was unanimously adopted.

2225

MISCELLANEOUS

AN Electrical Agent with strong wholesale and export connection in London wishes to contact manufacturers of Cables, Conduit, Switchgear, Bakelite and Brass Accessories, etc. Central showroom and warehouse available for present and post-war development. Write—Box H. 476, Willings, 362, Gray's Inn Road, London, W.C.1. 2217

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AGENCIES

MANUFACTURERS' Agents, covering the whole of Great Britain and Colonies, are desirous of contacting manufacturers with a view to sole selling rights (either commission or buying), post-war arrangements considered. —Box 23, c/o The Electrical Review.

EDUCATIONAL NOTICES

UNIVERSITY COLLEGE OF SWANSEA

(A constituent College of the University of Wales)

PRINCIPAL: C. A. Edwards, D.Sc., F.R.S.

APPLIED SCIENCE DEPARTMENTS

Engineering

Professor: Frederic Bacon, M.A.(Cantab.), A.M.Inst.C.E., M.I.Mech.E., M.I.E.E.
Lecturer in Electrical Engineering: R. G. Isaacs, M.Sc. (Bristol), B.Sc.(Lond.), A.M.I.E.E.
Lecturer in Civil Engineering: A. A. Fordham, Ph.D. (Lond.), A.M.Inst.C.E., M.I.Struct.E.
Lecturer: J. Selwyn Caswell M.Sc.(Wales), A.M.I.Mech.E., A.M.Inst.C.E.
Assistant Lecturer: W. E. J. Farvis, B.Sc.(Bristol).

Metallurgy

Professor: C. A. Edwards, D.Sc.(Manchester), F.R.S.
Assistant Professor: R. Higgins, Ph.D.(Glasgow).
Lecturer: R. Griffiths, M.Sc.(Wales).
Assistant Lecturer: T. B. Wilkinson, Ph.D., B.Eng. (Liverpool).

The College offers a number of exceptional advantages to students who aim at entering upon professional careers in Engineering or in Metallurgy. It is situated in the heart of an industrial area which includes a large number of works of very varied character, and presents an unrivalled variety of metallurgical practice. The Manufacturers of the district, who contribute largely to the support of the College, give the Staff and Students of the Applied Science Department every access to the Works, and the Managers, Engineers and Technical Officials co-operate with the Staff of the College in making visits to Works of practical educational value to the students.

Courses of study are provided (1) for the B.Sc. Degree of the University of Wales in (a) Civil Engineering; (b) Mechanical Engineering; (c) Electrical Engineering; (d) Metallurgical Engineering; (e) Metallurgy; and (2) for Diplomas of the College in (a) Civil Engineering; (b) Mechanical Engineering; (c) Electrical Engineering; (d) Metallurgy.

Persons who are not desirous of studying for Degrees or Diplomas may attend selected College classes, provided they satisfy the authorities of the College that they are qualified to benefit by such classes.

Entrance Scholarships will be offered for competition in April, 1943.

Particulars concerning admission to the College, and of the Entrance Scholarships, may be obtained from the undersigned.

EDWIN DREW,
Registrar.

Singleton Park,
Swansea. 2196

EDUCATIONAL NOTICES

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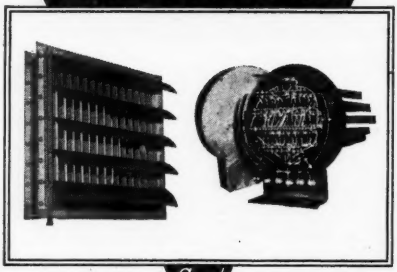

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